RAILROAD GAZETTE

FRIDAY, JULY 13, 1894.

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The office of the Railroad Gazette is now at 32 PARK PLACE, New York.

Contributions.

Fast Track Laying.

DIVISION No 2, June 20, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I saw in your paper a short time ago that Mr. Sullivan, Roadmaster on the 3rd Division, laid 5½ miles of new steel and three switches, which was considered quite a piece for one day's work, but I think Mr. E. E. Stone, Roadmaster on our Division, has done just a little better than that. On Thursday, June 7 he laid from West Warren to Palmer a distance of 8½ miles including two switches, this I think was the most ever laid in one day on this road.

SECTION FOREMAN.

The Value of Exhibits at the Technical Conventions

The Kinsman Block System Company,
NEW YORK, June 28, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been much struck by the great benefit likely to be derived by exhibitors who have meritorious devices, at the conventions of the Master Mechanics' and Master Car Builders' Associations, also by the probable great value of those exhibits to those who attend the conventions. In my opinion these benefits would exceed those derived from any similar exhibit made during the whole term of the Columbian Exposition. The reason is not far to seek, as the attendance at the Master Mechanics' and Car Builders' Conventions is mainly made up of practical railroad men who are there for business, and not as mere curiosity seekers.

After an attendance dating from 1892, I cannot too highly recommend these conventions. It is my opinion that the railroad journals do not give this matter the attention it deserves. I believe that a more thorough canvass of this subject some time before the date of these conventions, would bring together a large number of exhibitors, if they were made to more fully realize the importance of the occasion.

FRANK E. KINSMAN.

Locomotive Fire Kindlers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I do not want to put a stick in anybody's wheel, but there is one side of this question of locomotive fire kindlers which does not seem to be considered. The claim made for any new method is that pressure can be got up quicker than by any other method, but how is this going to affect the matter of broken staybolts, cracked back tube sheets and similar happenings? There can be no doubt that if more time is given for a fire to kindle less trouble will be experienced with broken stays and cracked sheets. Any saving in time that can be affected up to the point of applying the match can be charged to profit at once, but any time saved from the time of applying the match to the time of obtaining the required pressure, must have charged against it the results of more severe action on the plates and stays. If these two accounts do not balance or show a profit, then the loss must be made good by drawing upon the saving in first cost shown by the kindling device. If any saving can be produced with out subjecting the mateial of the boilers to the evil effects of some parts being quickly heated while other adjacent parts remain cold, the device giving such results should be well received.

There can be little doubt that if a thorough investigation were made of the causes of broken stay-bolts and cracked sheets, which trouble seems to be on the increase rather than on the decrease, the appliance generally in use for hastening the fire in locomotive boilers will be found to be the cause of much of the difficulty. FIRE BOX.

A Remedy for Strikes.

BOSTON, July 6, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is not necessary to dwell upon the great injury done to all classes of society and to all interests by the formidable railroad strikes which occur so often, nor upon the difficulty of preventing them. I wish, however, to suggest what appears to me a possible preventive, for of course the aim should be to prevent rather than to cure.

My suggestion is that a national law should be passed allowing railroads, or compelling them, to require each person employed in the actual movement of trains, either as switchman, trainmen, fireman, or engineer to enlist by signing enlistment papers for a given term of service at a given rate of wages; not a mere commercial contract but one having imprisonment penalties attached, substantially the same as those enforced under national army regulations and marine laws, tempered of course with humanitarian proivsions such as discharge, from the service at any time upon certain conditions agreeable to both railroad and employee, the period of enlistment to run for not less than six months nor more than three years, which will not allow a large number of men to leave at any one time. The benefit to railroads is obvious and, no less so to the employed, as they are guaranteed a stipulated rate of pay for a given time; they are also protected against the consequences now so serious, in a money way, in their effort to protect themselves. Desertion will be punishable by imprisonment; imprisonment is first of all as a preventative of contract breaking. Unanimity of railroads could, no doubt secure such a law.

Laws are now in force, to protect the public against discrimination and loss by reason of unequal freight and passenger rates and advantages but not against the greater loss to them occasioned by strikes, hence we may assume that approval rather than opposition to such a law would come from that source.

With such a law in effect the would-be railroad employee is allowed to do his striking for a particular salary, before he enters the company's service, with quite as good prospect of success as under the existing order of things, and without inflicting loss upon the country at large. Again the disposition of any man to strike for an unreasonable advantage before he is in a position to cripple a common carrier is less pronounced than after he is placed in such a position.

Our railroads must, from the very nature of the service they perform for the country, be placed side by side with the U. S. army, navy and marine shipping so far as laws bearing upon the right to strike, desert or boycott are concerned and therefore logically, and in justice to all, laws fixing the period of service, penalties, etc., should be the same for one form of service as the other.

H. A. H.

Compound Locomotives for Passenger Trains.

BOSTON, July 3, 1894.

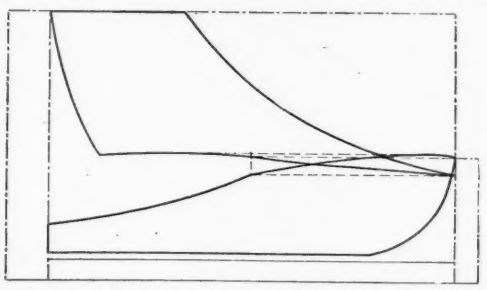
TO THE EDITOR OF THE RAILROAD GAZETTE:

Among the master mechanics at the Saratoga Convention the idea quite commonly prevailed that compound locomotives are admirably adapted for freight service, but not for passenger service. While this idea was so common, nobody ventured to state why, beyond the bare fact that many compounds have used no less and sometimes have used more coal than simple engines in passenger work. This is, of course, *prima facie* evidence of a fact; but this alleged fact is contradictory to the evidence of European practice, except, perhaps, in the case of some French four-cylinder compounds. Across the Atlantic passenger compounds are more commonly used than those for freight.

The truth is, that the compound is just as well adapted for passenger service as for freight if it is designed so as to be free from those defects for quick work to which the simple locomotive is not subject, and which may more than neutralize all gains that the compound system can and is expected to realize.

The causes of economy which come from fast piston speed and frequent reciprocation are just as real in the cylinders of a compound as in those of a simple engine, but with increased speed come difficulties in the compound which do not exist in the simple engine.

First: there is the difficulty of excessive compression in the high pressure cylinder which may absorb work which might be used in pulling the train. This may be overcome by giving no lead to the valve, increased clearance volume to the cylinder and large inside clearance to the valve.



Theoretical Indicator Diagrams, Two-cylinder Compound.

Ratio, two to one. Continuous expansion through both cylinders.
Vertical scale: 125 lbs. to the inch.
Horizontal scale: 1.2 in. = 1 ft.

Second: there is the absorption of energy from the steam, or loss of work in passing from one cylinder to the other. The steam is sensitive to obtructions and small passages after it leaves the high pressure clyinder, with the result that the high pressure piston is subject to a back pressure, far in excess of the normal receiver pressure. This is without doubt the principal cause of want of economy in some passenger compounds. Two cylinder compounds that have their intercepting valves near the low pressure cylinder are more likely to have this defect than those with this valve near the other cylinder, for the steam must pass through a comparatively small obstructive opening in the former case when entering the L. P. steam chest. It is best to have all of the restricted passages as near the high pressure steam passages as possible, so that the steam will pass them before it has enlarged its volume to any extent.

Third: there may be a genuine drop in pressure in the receiver, due to a wrong point of cut-off in the low pressure cylinder. This causes expansion of the receiver steam without doing work, and prevents expansion from beginning in the low pressure cylinder where it ends in the high. This difficulty need not exist in the case of an engine working under its usual conditions, for fortunately it is easy to determine the proper point of cut-off in the L. P. cylinder for any cylinder ratio. Merely dividing the stroke of the L. P. piston by the cylinder ratio gives with mathematical precision the proper point of cut-off of the L. P. cylinder of a cross-compound engine. For example, if the clyinder ratio is 2 to 1, and the stroke of the L. P. piston is 24 inches, the point of cut-off is $24'' \div 2 = 12''$; if the ratio is 2¼ to 1, the point of cut-off is $24'' \div 2\frac{1}{4} = 10\frac{2}{3}''$; if the ratio it 3 to 1, the point of cut-off is $24'' \div 3 = 8''$. This rule applies only to a compound engine with cranks at 90°, and not to a tandem compound. In the latter case receiver volume is a factor. The above rule is independent of the point of cut-off in the H. P. cylinder. A fourth difficulty is insufficient port opening in the L. P. cylinder, and this really amounts to a part of the second difficulty, for it causes a greater difference between the pressures at the end of expansion in the H. P. cylinder and the beginning of expansion in the L. P. cylinder than would otherwise be the case. There are some two cylinder compounds that have the L. P. ports, but little larger than those of the H. P. cylinder. In such locomotives it would be safe to predict a want of economy in water consumption at high speeds. The velocity of the steam through the L. P. ports is enormous, and some 2½ times the greatest in a simple engine, which is already by far too great.

How can this difficulty be overcome? The experience of the writer with ports $24'' \times 1\frac{1}{2}''$ is so entirely satisfactory that he would have no hesitation in making them 30", or more if needed, by 1½". A valve to suit such a port need weigh no more than many valves that are now used on 18" cylinders. Moreover, it is easy to make a light double-ported valve, which would have a port opening amounting to double that of the common valve. Such a valve would give a port opening, say $\frac{3}{8}'' \times 60'' = 22\frac{1}{2}$ sq. in. when "hooked up." This is 3.2 per cent. of the area of a 30-in. piston, and is a percentage nearly half as large again as that of the port opening of many successful 18-in. simple engines. A piston valve for the L. P. cylinder provides a common means of securing large port area, but the obstruction of its numerous bridges renders it, it appears, no more effective than the common single-ported slide valve.

The loss of work between the cylinders of a compound locomotive has been as great as 30 per cent. of the work capable of being done by the steam, and completely nullified the saving that the engine would otherwise have effected, while that of another has been only 8 per cent. when running at the same speed. In the latter case the proportion of useful work done by the steam, bore as large a percentage to the theoretical as in the case of a simple engine doing the same work with the same initial pressure and ratio of expansion. In this comparison the loss of work between the cylinders of the compound was fully made up by the low initial pressure in the L. P. cylinder, and the resultant later and less compression required (and performed) in that cylinder.

From this last it is apparent that as large an indicator diagram area can be obtained from the compound as from the simple engine in fast work, with the additional advantages of greater expansion and reduced cylinder condensation in the compound.

To the objection, sometimes heard, that the receiver steam is incapable of quick starting from rest on account of its low pressure, it can be stated that this is purely imaginary, as the velocity of any common steam movement is far within the capacity of steam of any pressure.

The diagram herewith shows the conditions existing with continuous expansion through both cyinders of a two cylinder compound locomotive, when the cylinder ratio is 2 to1.

F. W. DEAN.

The Baldwin Compound on the Missouri, Kansa & Texas.

Compound locomotive No. 290, recently delivered to the Missouri, Kansas & Texas, by the Baldwin Locomotive Works, made an excellent performance in heavy passenger service during tests made May 18 and 19. The locomotive is of the ten-wheel type. The tests were made on the division between Parsons and Franklin Junction, a distance of 198 miles, and were intended more particularly to demonstrate the efficiency of the locomotive to sustain a uniform speed up steep grades, no attempt being made to obtain maximum speed.

The train consisted of one postal, one express, one baggage car, two coaches, two chair cars, two Wagner sleepers

and General Manager Allen's private car. With this train a speed of 48 miles an hour was maintained up the 50-foot grade south of Ronald, and 41 miles an hour up the 55-foot grade into Nevada. At Sedalia, another chair car was added, making a total weight of 363 tons, exclusive of the engine and tender. The train left Sedalia 17 minutes late, due to delay at Sedalia, and was on time at the top of Boonville hill; the run over the 71-foot grade being made at speeds varying from 38 to 45 miles an hour.

The return trip on the following day was made with ten cars. With this train a speed of 27 miles an hour was maintained up the 71-foot grade from Boonville. Twenty-three minutes' lost time was made up between Sedalia and Parsons, arriving at Parsons on time.

The motive power department of the Missouri, Kansas & Texas considers that the performance of the locomotive was entirely satisfactory.

Test of a Bridge to Destruction.

BY TH. DELMAR, C. E., PH.D.

Tests have been recenty inaugurated and partially completed by certain Swiss railroad companies on full size bridges which have been replaced by heavier ones. The material of these old bridges, which has in most cases served for 20 to 30 years, is now being tested carefully in the laboratory while other bridges are being loaded until

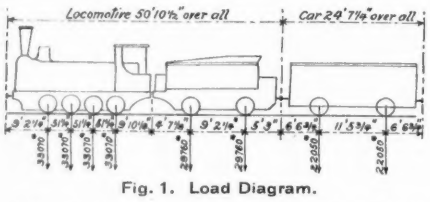


Fig. 1. Load Diagram.

they fail. The broken members of these will also be tested in a testing machine after the structure has failed. The following is a report of a rupture test made last April. The structure was on the line of the Jura Simplon Railroad, between Berne and Luzerne, and this is believed to be the first instance of such a test.

The tests were carried out under the following programme. The structure was first removed and erected upon concrete abutments large enough to provide a good distribution of the pressure. The channel iron struts, which connected the middle points of the diagonals and gave safety against buckling, were left off. The rivet holes may be seen in Figs. 3 and 4. The effect of removing these and the weakening of the members by the riveted holes is evident. The heights of all panel points on the top and bottom chords were leveled, and all faults in members were carefully noted. Advancing from panel to panel the prescribed maximum load of three locomotives followed by cars (see Fig. 1) was applied and the heights of panel points and deflection of members were taken for half and for full loading of bridge. The total load mentioned was then put upon half of the bridge and the panel point heights and the deflection of members measured again. This load was allowed to stay for several hours in order to learn if the sagging in the center of the span increased. The load was increased on the same half of the bridge by adding about 650 lbs. per ft. until rupture occurred. To prevent great shocks when the bridge gave way timbering was provided. The results of the test were noted at once and recorded. Before the test the deflection of the bridge, its capacity and strength were determined by computation.

The bridge was 159 ft. 5 in. in length over all, and was a single track through skew span. Figs. 2, 3 and 4 give a good general view of its construction and details. It was built in 1874 and the traffic opened in 1875. In 1876 the diagonals 13-14 and 11-12 had been damaged by long timbers carried on a freight car. They had been bent ¾ of an inch outward but had been left in the structure, being considered safe. These damaged diagonals were the reason why only the half length of bridge was loaded for the final test, for the engineers were anxious to know whether when the maximum load, as regards web members, was placed upon the bridge these would be first to break. In 1880 the floor beams which had been latticed between the stringers were provided with plate webs. In 1891, after the Moenchenstein bridge disaster, the diagonals had been reënforced by connecting them together at the middle by channels riveted to each diagonal. The bridge was of wrought iron and had been computed for 9,954 pounds per square inch allowable stress and for a load of 3,024 pounds per linear foot and for a dead load of 1,210 pounds per linear foot. The bridge was removed from its old seats in the beginning of April and placed upon concrete abutments built for the purpose. The bearings were oak ties bolted together, the height of the bottom chord from the earth being about 2 feet. In moving the bridge it suffered slight injuries at several points. The floor beams showed little cracks, but all these places were carefully marked and noted.

The first loading of its whole length was with 3,900 pounds per linear foot corresponding to the locomotive diagram given in Fig. 1; gravel and rails were used. Under this load the truss BB showed a deflection of 1.85 inches, which was the same as had been determined by computation, but the truss AA had 1.93 inches, while that determined by computation was only 1.73. This result is explained by the fact that the truss AA was built with angles 3.5 x 3.5 x 0.4 inches while the truss BB had angles that were 3.15 x 3.15 x 0.4 inches. The truss A had been made stronger because it was on the outer side of the curve and had therefore to resist the centrifugal force. The greater deflection of the truss A is accounted for by the injury which the diagonals 11-12 and 13-14 had suffered in 1876. The average ratio in deflection and in length of span for the load of 3,900 pounds per linear foot (which is about 30 per cent. more than the load for which it was computed) was $\frac{1}{1000}$. The diagonal 8-11 in the center showed 0.83 inches maximum deflection in the direction of the bridge's length.

The load, which had been distributed upon the whole length, was next concentrated on the half span (see Fig. 2) giving a load of 7,900 pounds per linear foot. The deflection was for truss AA 2.17, for BB 2.6 inches and the middle diagonal 8-11 showed a deflection in the direction of the bridge's length of 1.54. An exact computation in which the secondary stresses were considered showed that the panel point 21, Fig 2, on the truss BB was the danger point. The reasons for that were, the position of the load, that the inner truss was weaker and heavier loaded than the other, that the truss BB was loaded for a greater length than AA, owing to the skew span. Furthermore, the inclined end post of truss BB is of unsymmetrical cross section, the members being fastened eccentrically. All these circumstances made the computed stress in this panel point 48,350 pounds per square inch. Not the slighest deflection or irregularity was visible, and the apparatus for measuring the compression showed that only one of the top angles of the inclined end post was working. This extends to prove that the present theory of secondary stresses gives results too great, and that the secondary stresses in ordinary cases may be neglected.

The load was next increased to 8,900 pounds per linear foot by adding gravel. The deflection under this load for truss AA was 2.4 in. and for BB 3.1 inches. This load remained on the bridge from the evening of the 24th to the morning of the 25th of April. It was generally believed that the bridge would fail under this load during the night, but the testing commission was agreeably disappointed, for the bridge was standing in the morning and the deflections were but slightly increased. Truss A had increased from 2.4 to 2.52 inches and truss BB from 3.1 to 3.15 inches, the ratio in deflection and length of span being then for A 1-760 and for B 1-610. The load was then increased by putting rails on the top of the gravel as seen in Figs. 2, 3 and 4 until the loading was equal to 9,400 pounds per linear foot. Even this load did not produce rupture and the loading was advanced over the middle panel 6-8. When about 1½ feet of gravel had been added to this panel the bridge suddenly fell without warning or any marked preliminary deformation. The compression diagonals 6-7 truss BB (not the diagonals damaged in 1876) were bent out in the direction of the bridge's length at the point where the 4 riveted holes had been made for the stiffening channel and shown in Figs. 3 and 4. After it had failed, several other compression diagonals were bent all in the direction of the bridge's length as shown in Fig. 2. The buckling was in the direction of the least radius of gyration. Only the diagonals 12-13 and 14-15, which were in tension, were bent transversely to the bridge axis. These are shown in Fig. 3, and this was probably caused by falling when they were subjected to compression. The chords were bent and broken, as shown in Figs. 2 and 5. The part 8-21 went down, while 1-6 was bent upward, and near the panel point 6 both upper chords were deformed. The wind bracing remained intact when the bridge gave way and all rivets in all members remained unbroken. The total load under which the bridge gave way was 704,000 pounds. The diagonal 6-7 was under a stress, when it was bent, of 17,060 pounds per square inch for buckling, while the computation showed that it should have buckled when subject to 14,330 pounds, the difference being about 20 per cent.

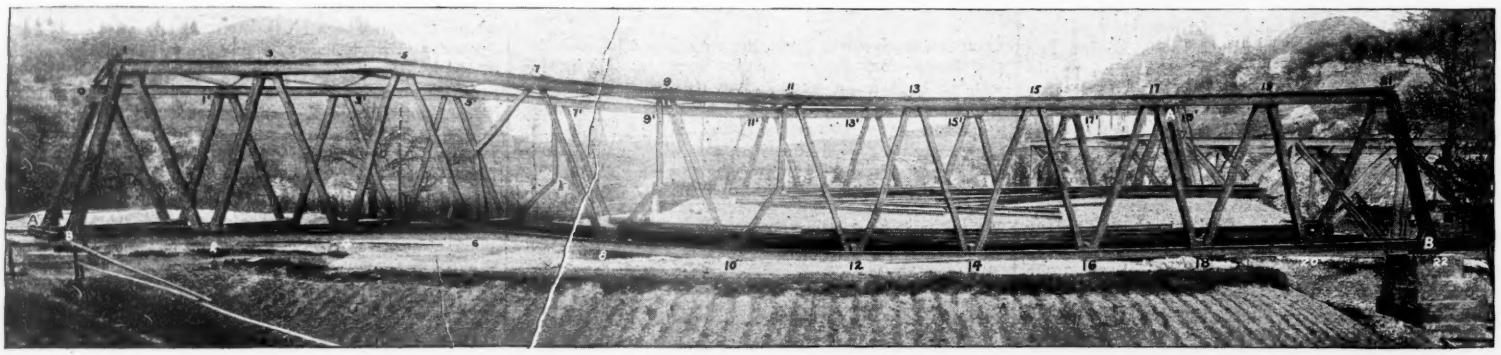


Fig. 2. Showing Bridge and Loading after Failure.

If computed with Euler's formula, $\frac{\text{ratio of length}}{\text{radius of gyration}} = 141$ (in the present case), we would have to take only 0.75 of the length as free bending length as then it would well agree with the results of the test.

The bridge being of good material and workmanship, it

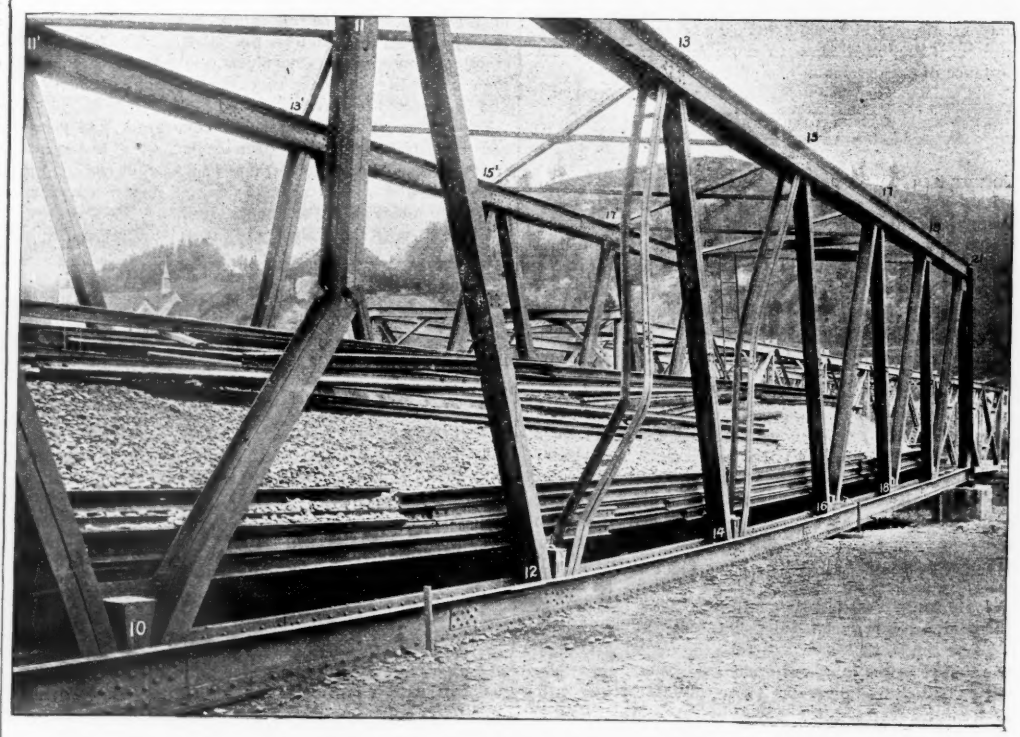


Fig. 3. Perspective View of Loaded End.

was a matter of considerable surprise that it gave way so suddenly and without warning. Not a single crack appeared previous to the fall. This circumstance rendered the study of the action of the metal and the working of the members impossible and raised some doubts as to the real value of such tests of structures.

The dimensions of the diagonal and chord members which broke are as follows:

Truss BB: Panel lengths, 14.9 feet. Diagonal 6-7, four angles 3.15 x 2.56 x .315 inches and a plate 9 x .314 inches.

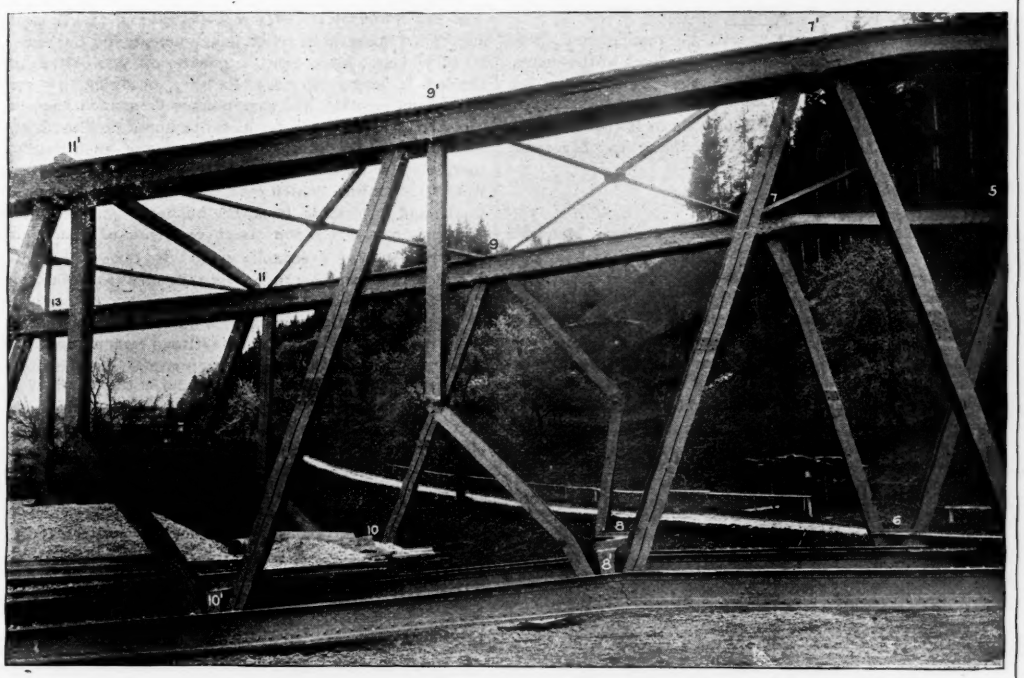


Fig. 4. Perspective of Middle Panels.

Tension Diagonal, 7-8, four angles 3.74 x 2.36 x .354 inches and latticing 2.36 x .315 inches. Diagonal member, 8-9 in compression had four angles same as 6-7, and a plate 9.76 x .315 inches. Tension members, 9-10, 12-13 and 14-15 were the same as 7-8, and compression member 10-11 was the same as 6-7. All these diagonals have rivet holes at the middle of their length which are shown in Figs. 3 and 4; as it was at these points that the members failed.

The inclined end post at panel 21, which was theoretically the danger point, was composed of 1 plate 9 inches, x.47 inches four angles 4.72 x 3.15 x .47 inches and two angles 3.75 x 2.36 x .354 inches. The four angles and plate were in the form of an I, built girder, and this was reinforced by two smaller angles riveted to the top.

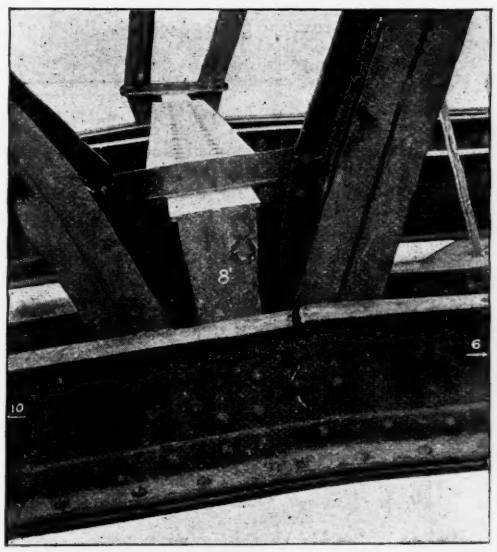


Fig. 5. Rupture of Lower Chord.

Present Utility of Electric Motors on Railroads.

At the April meeting of the Western Railway Club Mr. D. L. Barnes presented a paper on the above subject, extracts from which were given in *Railroad Gazette* of May 4 last. The following is a synopsis of the discussion of the same paper at the May meeting of the club.

MR. GIBBS: The curves which Mr. Barnes gives, showing the interdependence of speed and work done, are exceedingly interesting as they give us much definite information upon which to base calculations as to the efficiency of electric transmission. The conclusion that in average railroad service electric transmission of power will not be found more economical than the use of the steam locomotive, except where there is a substantial difference in the character and cost of fuel which is burned, I do not think can be controverted.. The conclusion that the same weight of bituminous coal in a stationary plant will produce the same results at the drawbar of the train is important, as showing that the alleged fuel saving by use of electricity is not in the weight used. This is a little discouraging to electricians, but they will have to devise a motor which is of higher average efficiency under different conditions of speed and power, before they will accomplish anything over this result.

The even pull of an electric motor, allowing an increase in hauling power is a very important point and I think will be found to be a matter of substantial gain in using the electric motor. In some late tests a locomotive with 3,000 pounds less weight on the drivers and a 6-inch smaller wheel, was able to haul about one car and a half more over a hill than a larger and heavier locomotive. Of course in this comparison each locomotive had cylinder power sufficient to utilize all the adhesion due to its weight.

MR. BAKER (Mr. Baker was General Manager of the Intramural road at the World's Fair and will have charge of the rolling stock of the Metropolitan Elevated, Chicago): The matter of the use of the alternating current, is not a matter of great importance on short lines. It may come into use later on lines of greater length. The difference between it and the continuous current or in the machines used in the two currents are not so serious as to make much difference in the machines themselves, but when it comes to distribution of the current it becomes a matter of a great deal of importance.

We used on the Intramural road, electric motors under the car. The weight of the passengers assisted in getting the weight on the wheels necessary for the traction. The motors themselves weigh about 20,000 pounds, with their attachments, whereas a locomotive to do the same work and give the same traction would weigh in the neighborhood of 30,000 pounds. The result is that your trains will only weigh about 80 per cent. of what they would if you used a locomotive, either electrical or steam. That means that you have less actual work to perform in moving the train passengers over the road. That is a saving of some 20 per cent.

Four motors make a very economical arrangement, because at one-fourth speed, the four motors being in a series, you are getting the utmost economy. That is, a few seconds after you leave the station the motors are working to their full efficiency. With two motors you have to accelerate the speed through a distance of half a train length before the motors are working to their full efficiency, and with one motor it must be working at full or normal speed before this efficiency is attained.

The number of passengers carried on the Intramural road from the first of May to the first of November averaged a little over 33 passengers per train mile, including the light month of May. Passengers on the Manhattan road in New York will average about 24 to the train mile, and on the roads here in Chicago, it must be considerably under what they are in New York. In the month of October we carried over 50 passengers to the train mile, so that as far as the service goes, while we did run we did a pretty heavy service. The average speed was not fast; it was about 10 miles an hour, but it would have been much better except for the great curvature of the line. The result of this was: That after we had expended the power necessary to accelerate the train to a speed of say 20 or 25 miles an hour, we could have continued at that speed until necessary to put on brakes to stop at the next station for the curves. A speed curve for the train would rise to about 20 or 25 miles an hour, and then fall off to about 10 miles an hour, and continue at that speed until within braking distance of the next station. Now we could have maintained 20 miles with a very slight expenditure of power if the rack had been straight. Our total cost for fuel for the month of August was 4.3 cents per train mile, under our conditions. For the previous months it was somewhat larger than that, but considering the disadvantages under which we worked, the short time we had to effect an organization and the fact that economies which we plainly saw before us could not be put in operation on account of the time required, that figure is not too low, and it can be done under the same conditions for less money than that.

The arrangement of the locomotive spoken of in this paper would not make the strain on the track or structure much less than with the steam locomotive. It can be arranged, however, so that a lighter structure will do. As to the wisdom of building a lighter structure, that is another question; most of the elevated roads have been built lighter than they should be for the increased traffic. There are very few definite facts and figures by which you can compare the expenses of repairs of motors and locomotives, but the motor is the simplest apparatus There has not been much experinece in building them; therefore a number of small details are apt to be not quite so well adjusted to their work as is the locomotive.

MR. BARNES: The Metropolitan Elevated, of this city, will commence operation this fall with electric motors, the Northwestern Elevated (now projected) will also be operated by electricity. It is generally conceded now that no new elevated roads will be operated except by electricity and the Manhattan, in New York, is considering the feasibility of changing, for the reason that motor trucks can be put under the cars and the concentrated weight can be reduced.

I do not see how the number of "passengers to the train mile" on the Intramural forms any indication of the traffic. That road was 2 or 3 miles long. The Manhattan is 12 miles long. In one case a man rides 12 miles for five cents and in the other 2. Now on the "Alley" road here, they formerly had more passengers to the train mile even with a light traffic than they had on the Manhattan, in New York City. The weight of traffic is measured by the individual weight and speed of the individual trains when loaded. The difference between a maximum speed of 20 to 25 miles on the Intramural and the 30 to 35 miles made on the elevated roads is a ratio of 4 to 9 as the stored energy varies as the square of the speed. Also there is quite a difference in the average speeds of 10 and 15 miles an hour under the two conditions. The weight of the structure can be reduced by putting motors on cars, but the structures must be strong enough to stand the strain when the brakes are applied; the weight is not reduced as much as one would suppose, but considerably lighter structures are possible where electric motors are used.

MR. BAKER: We ordinarily ran four cars on a train. We only had motors on the first car. Motors on every axle is one extreme and the locomotive is the other. One of our cars, weighing about 26,000 pounds, with about 14,000 pounds passengers and about 20,000 pounds motors and appliances, would make a weight of 60,000 pounds, which gives the traction of a 30-ton locomotive and a little more, as that only has about 20 tons on the drivers, the rest being carried by the pilot wheels. You get more traction than with the locomotive and it is not necessary to go any further back with the motors.

We have pulled eight loaded cars with one motor car, and I handled one night twelve cars with a motor car at the head and one in the middle and pulled them very easily. In letting the cars down the incline of the road at the conclusion of the Fair, we had a string of over thirty cars handled by two motor cars at the head. So I do not really know exactly what they would do if they were put to it. The motors will slip the wheels and you get all the advantage of the traction.

There would be no advantage in going to the other extreme and put a motor on each axle. You would get too complicated a state of things. But when it is a question of one large motor on a locomotive and four smaller ones on the train, I believe the question will about balance. It is a matter that would probably be very hard to get at, and would require perhaps a number of years' experience under different conditions.

MR. GIBBS: I would like to ask Mr. Baker how he would expect to collect from outside conductors a current of 800 amperes at a speed of 40 miles an hour.

MR. BAKER: We have run experimental trains on our own road at night at a speed of 37 miles an hour, and had no difficulty in collecting the current from the very simple arrangements we had, but it might be if that speed had continued for a long time, the shoe with which we collect the current would have become hot. The shoe we used was a common cast-iron shoe running on a rail and kept fairly cool all the time. With the stops as frequent as on an elevated road or suburban service I do not think any trouble would be experienced at all. For long distance service I am not prepared to meet the problem.

MR. L. B. STILLWELL, (Westinghouse Electric Co.): One of the most instructive comparisons we can make, and one that is perhaps the most definite to practical railroad men, is the power of transmission of the cable. A steel cable 1½ inches diameter, traveling 12 miles an hour, can transmit nearly 2,000 horse power—it would break with 2 2,000 horse power. But if we take a copper wire, having a section of one square inch, and apply to it such a potential as is practically in use to-day, in at least one place in this country—10,000 volts—at 1,000 amperes to the square inch, we find we are transmitting in an invisible form over that wire over 13,000 horse power, which is enough to instanty rupture six cables such as are used ordinarily in our cable traffic. Wire may also make a comparison with some of the large dynamos at the World's Fair, where 1,000 horse power was transmitted through a 6-foot belt running at a speed of a mile a minute. We can transmit through a copper wire having one inch area, as much power as you can transmit through six of those belts. I think that is interesting in connection with the probable future of electricity in railroad service.

PRESIDENT FORSYTH: Last summer an eminent engineer said that the most remarkable mechanical exhibit at the Fair was the Intramural road, but so far as economy of fuel is concerned, I think it is well that Mr. Baker has explained how he was handicapped by the curves on his road, because when we compare his performance with that of a good steam locomotive, and find that the cost of fuel per train mile on the Intramural was about 4 cents on a 50 or 60 ton train while on our steam railroads we can haul for the same expenditure of fuel a freight train weighing 500 tons, which is in the ratio of 1 to 8, showing that with our steam locomotives we are doing eight times as much as they did on the Intramural.

MR. GIBBS: The problem that our electrical friends should solve for us as railroad men is to run a power station and supply current to a considerable and variable length of railroad line with a variable traffic, having, say, sometimes 60 trains on the road, at other times 2, with a first cost of plant not unreasonably in excess of that of our present plant, and a fuel economy comparable with the figure mentioned by Mr. Barnes—1.8 pounds coal per indicated horse power per hour. This figure has been reached by a triple expansion engine running at the most economical point of cut-off and generating a constant amount of power, but there is an immense amount of data lacking to show us that the electric railroad and power stations are at present doing the same thing for anything like that cost. The average amount of power generated by the consumption of one pound of coal at the central station in the principal power and electric light stations in the country, are so low that we would be ashamed to acknowledge them as the average for locomotive performance. We would like to have figures for depreciation on electrical apparatus, especially on motors and their connections. From one point of view these should constitute a most durable class of machines, having no mechanically unbalanced parts and subject only to journal and commutator friction for wear. But practice has indicated a number of structurally weak points, and frequent liability besides to impairment of insulation by reason of excess current and other causes.

MR. STILWELL: Whether or not the actual efficiency obtained by the electric generators and motors is equal to

the results obtained in the steam railway practice, I do not know. It will take some time to get sufficient experience on the electric side of that question to know its exact value. In any large steam plant that is reasonably well planned, we can operate with a consumption of 3 pounds of coal per horse power per hour.

PRESIDENT FORSYTH: Let me ask if this is horse power at the drawbar of the train.

MR. STILWELL: No, sir; at the shaft of the engine. Brakehorse power. Now the efficiency of our electrical transmission, if you assume about 20 miles distance, including the efficiency of the generator, the transformers for increasing the pressure, the transmitting circuit, reducing transformers and a motor at the other end, is at least 65 per cent. You can obtain a guarantee of the best companies in this country covering that figure and some of them would attempt to guarantee higher figures. In some cases you can get 70 per cent. Now if you take the efficiency to be 65 per cent. we have a horse power for less than 5 pounds of coal at our generating station. There will be some further loss in getting that to your draw-bar pull undoubtedly, but I do not think that the results obtained on the Intramural road at the Fair are a fair criterion for a broad comparison of the relative efficiency of these two systems. We certainly have in starting with our stationary engines a great advantage in efficiency and we may hope in time to compete with the steam locomotive.

MR. BARNES: I would like to ask Mr. Quereau as to the fuel required per horse power per hour on steam locomotives.

MR. QUEREAU: A horse power hour can be generated on a locomotive with from 25 to 28 pounds of water with a simple locomotive. We evaporate anywhere from 5½ to 6 pounds of water to a pound of coal in average service, not under the best conditions, which will bring it possibly, say, 5 pounds of coal. I suppose that is a little rough, but think it is perfectly safe.

The New Purdue Laboratory.

We gave in our issue of May 18 a general description of the arrangement of the engineering laboratories of Purdue University as remodeled after their destruction by fire last January. Since that time, as we have recently noticed, the locomotive "Schenectady" has been returned from the Indianapolis shops of the Pennsylvania Railroad Company and mounted in position for further experimental work.

The new plant occupies a building especially planned to receive it, and is arranged for the accommodation of any locomotive, either steam or electric. A wheel foundation of 25 feet is provided, which will be sufficient to carry the driving wheel base of any locomotive likely to be brought there for trial. For engines having six wheels coupled, a third supporting axle will be added, and for engines having eight wheels coupled, four new axles having wheels of smaller diameter will be used.

The brakes which absorb the power of the engine are the ones which were used in the original plant. The dynamometer of the original plant consisted of an inexpensive system of levers attached to a heavy framework of wood, the vibrations being controlled by dashpots. In the present construction, wood as a support is entirely abandoned, and a massive brick pier, well stayed with iron rods, has been substituted. The dynamometer itself consists of the weighing head of an Emery testing machine, the hydraulic support of which is capable not only of transmitting the stress it receives, but also of withstanding the rapid vibrations which the draw-bar transmits to it. The apparatus is of 30,000 pounds capacity. The draw-bar connects with this apparatus by a ball joint which leaves its outer end free to respond to the movement of the locomotive on its springs. A threaded sleeve allows the draw-bar to be lengthened or shortened for a final adjustment of the locomotive to its position upon the supporting wheels; and, finally, to meet the proportions of different locomotives, provision is made for a vertical adjustment of the entire head of the machine upon its frame.

The lever of the "tender floor" is at a sufficient height above the rail to serve as a platform from which to fire. At the rear is a run-way leading to the coal room, the floor of which is somewhat lower than the tender floor. A platform scale is used for weighing the coal which is delivered to the fireman.

The feed-water tank from which the injectors draw their supply, discharges into two small calibrated tanks so arranged that one may be filled while the other is discharging.

The conditions under which the engine is operated are at all times within the control of a single person whose place is just at the right of the steps leading to the tender floor. From this position he can see the throttle and reverse lever, and observe all that goes on in the cab. At his right is the dynamometer scale-case wherein is shown the load at the draw-bar; in front are the gages giving the water pressure on the brakes; and under his hand are the valves controlling the circulation of water through the brakes.

The London Underground Electric Railroads.

Parliamentary powers, it will be remembered, have been obtained for a number of electric lines in the metropolitan area of London, of which the following six are the most important:

1. City & South London—Extension to Islington.
2. Central London—Shepherd's Bush to Liverpool street.
3. Waterloo & City.
4. Waterloo & Baker Street.
5. Great Northern & City—Finsbury Park to Moorgate street.
6. Hampstead & Charing Cross.

All these are designed on the Greathead principle—*i.e.*, cast-iron, built-up tunnels—a separate one for each line up and down, running as far as possible under the streets (so as to avoid compensation for damage to the foundations of private property, etc)., and at a depth below the surface varying from 40 to 70 feet, means of access being provided by lifts and staircases, or even inclined planes. Moreover, all these lines are authorized to use electricity as the sole motive power.

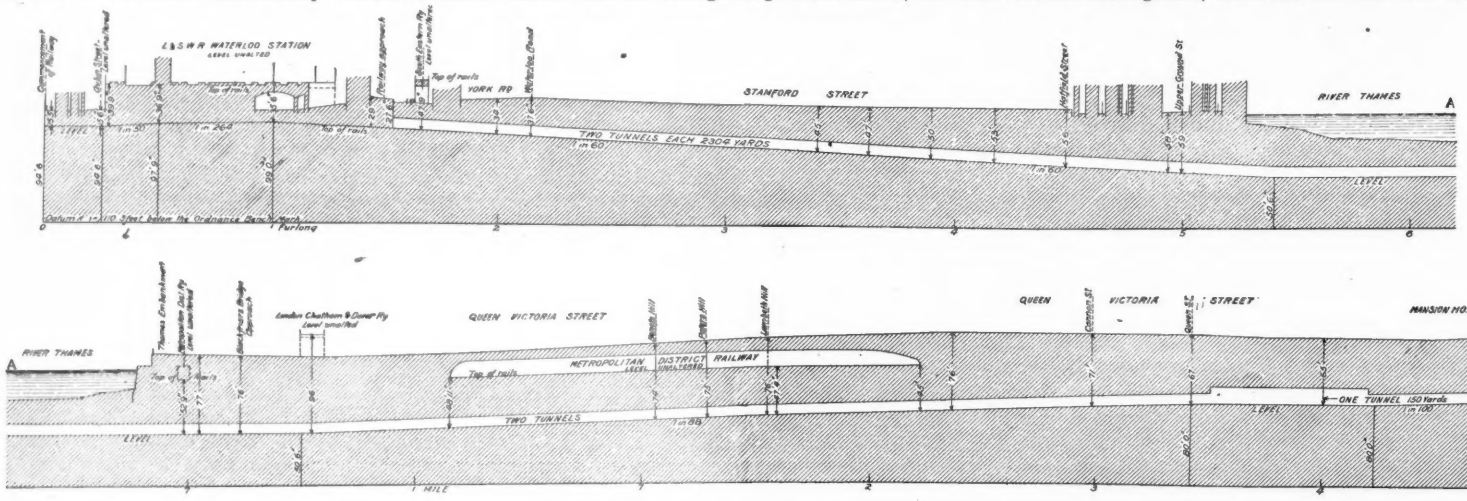
Taking them *seriatim*, the present condition of these projects appears to be somewhat as follows:

1. *City & South London Extension.*—This line commences near the Borough High Street station, and runs parallel with the present one for a short distance, then turns off to the right and passes under the eastern end of the London Bridge terminus of the South Eastern and London, Brighton & South Coast railroads, making connection therewith by means of subways and lifts from the underground station. From this point the line strikes north, under the River Thames, on much easier grades and curves than the old one, which has grades of 1 in 30 against the load, on heavy curves; and passing the present terminus in King William street, goes by the side of the Bank of England up Moorgate street and City road to the Angel tavern. No steps have, however, been taken by the railroad company to develop this extension in any way, as yet.

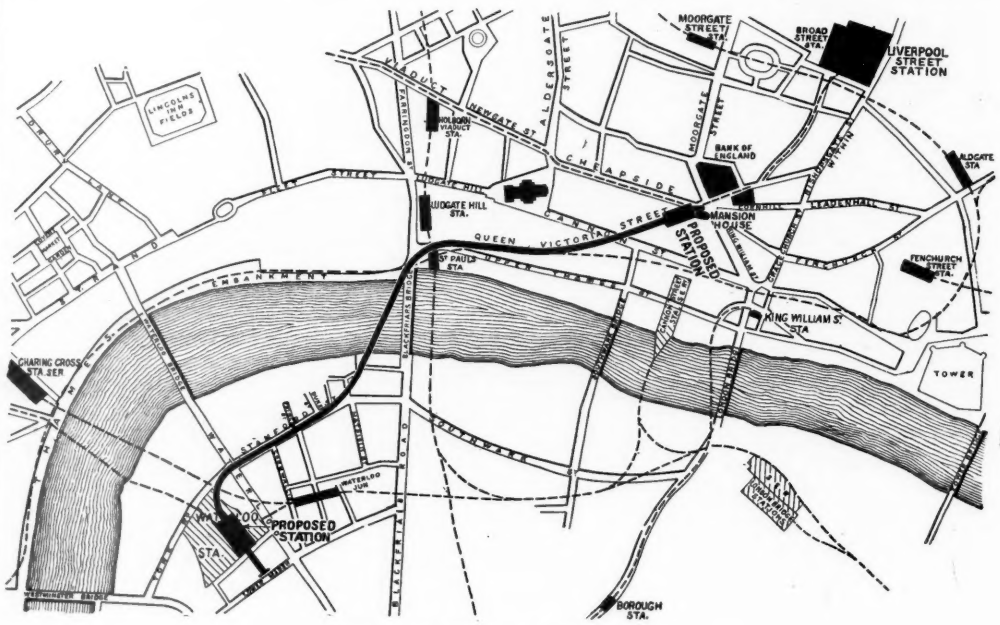
2. *The Central London* is in a somewhat similar condition, though it is perhaps a little further advanced. All necessary agreements have been made with the local authorities, plans are prepared and everything is in readiness for an immediate start when the financial details are in proper shape. At the present moment a bill for extending the time in which the line must be completed is passing through Parliament, and this will allow of another four years for carrying out the work.

3. *The Waterloo & City Railway* alone of all those mentioned above is in active development, and the reason is very clear. More than a generation ago, when the London & South Western Railway occupied no very flourishing position, the shareholders demanded that the capital account should be, as far as possible, closed, and the directors accordingly abandoned the plan (almost completed) of an extension into the city itself from the Waterloo terminus, which even then was incommodiously small and far distant from the business quarters. The Charing Cross to Cannon street extension of the South *Eastern* Railway eventually served to carry the South *Western* suburban passengers into the city from Waterloo, just as it does to-day; but the inconvenience of alighting at Waterloo terminus, walking a quarter mile or less to Waterloo Junction, on another railroad system, and there taking a train for the city (Cannon street), has been felt to be so great that there is no wonder at the South Western Company supporting the new venture, which will give it a rapid and convenient means of access to the city. Nothing need be said here with regard to the present transit arrangements from Waterloo Junction to Cannon street, on the South Eastern Railway. If the new underground line were to be conducted on plans in vogue amongst prehistoric races, it could not be any worse than the line above ground, where travelers have been known on a foggy day to lay in a store of sandwiches and liquor to last them over the two-mile journey between Charing Cross and Cannon street, for the simple reason that, although timed to run in five or six minutes, the trains might very likely take two or three hours.

It will be entirely operated by the South Western Railway Co., and though, of course, a separate corporation in itself, yet the close connection with the trunk line is seen from the fact that of the eight Directors on the Board of the Waterloo & City line, four are Directors of the South Western line, whilst a fifth is the General Manager, Mr. Scotter. The Chairman and Deputy Chairman are



Profile of Waterloo & City Electric Railroad.



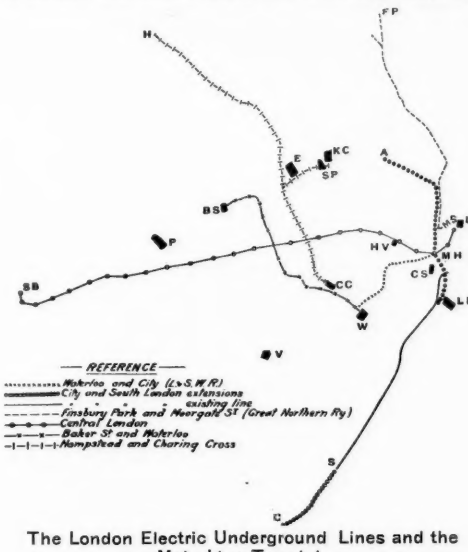
Waterloo & City Electric Railroad.

the same in both companies, and the Secretary of the one acts similarly for the other. The Engineers to the new line are Messrs. Galbraith & Church, Victoria street, Westminster, and, of course, Mr. J. H. Greathead, who is perhaps *ex officio* attached thus to all the new lines.

According to the prospectus, interest at the rate of 3 per cent. per annum on the whole of the authorized capital, whether raised by issue of shares or debentures, shall be a first charge on the gross receipts of the undertaking before any deduction is made for working expenses. If the whole of the authorized capital—£720,000—be issued, the interest charge is £21,600 per annum, so that a traffic of only £500 a week will make the guarantee safe. The South Western Company is to work the line at cost price, such cost not in any case to exceed 55 per cent. of the gross receipts. After payment of the above-named 3 per cent. first charge and working expenses, the balance of receipts is divisible between the two companies, the Waterloo-City shareholders getting two-thirds and the South Western one-third. Seeing that the South Western is to control the line to all intents and purposes—build, finance and work it—it may rightfully be considered part of the South Western system; and, more likely than not, after its completion, when the earning capacity has been gaged, it may be formally taken over by the South Western.

Tenders have already been advertised for and received for constructing the tunnels. Seven responsible firms of contractors sent in estimates, the five lowest ranging from £229,064 to £253,170, and the contract has been awarded to Messrs. John Mowlem & Co., at the bottom figure. The additional cost of stations, electric generating plant and rolling stock will probably not exceed £150,000, so that apparently the authorized capital will not require fully calling up; still less will the borrowing powers need exercising.

The exact length of line authorized is 1 mile 4 furlongs 6.8 chains. The time occupied in transit will not exceed four minutes, as there are no intermediate stopping places. The gradients in both directions are such as help at starting and tend to brake the trains when approaching termini—that is, the line dips down under the Thames and rises again each side. The sharpest curves are just outside Waterloo, at one or two points before reaching the river, and at Blackfriars Bridge, where the line turns under Queen Victoria street, but none are of less radius than 5 chains. The maximum grade, as shown in the sections, is 1 in 60.



The London Electric Underground Lines and the Main Line Termini.

H = Hampstead.
F P = Finsbury Park.
A = "Angel" Islington.
MS = Moorgate St.
MH = Mansion House.
S = Stockwell.
C = Clapham.
SB = Shepherd's Bush.

MAIN LINE TERMINI:

E = Euston: L. & N. W. R.
SP = St. Pancras: Mid. R.
KC = King's Cross: G. N. R.
BS = Baker St: M. S. & L. (future).
P = Paddington: G. W. R.
V = Victoria: L. B. & S. C. R. and L. C. & D. R.
W = Waterloo: L. & S. W. R.
LB = London Bridge: L. B. & S. C. R. and S. E. R.
CS = Cannon St.: S. E. R.
CC = Charing Cross: S. E. R.
HV = Holborn Viaduct: L. C. & D. R.
LS = Liverpool St.: G. E. R.

The tunnels—as with nearly all those now projected—will be 12 ft. in diameter, with extra allowance at stations and at the curves. On the City & South London Line, which it will be remembered is only 10 ft. 6 in. in diameter, some trouble has been experienced. Not only is it necessary to keep the trains quite short (*i.e.*, three cars only), but the small size of tunnel prevents the use of motor cars. The question of locomotives or motor cars has, however, not yet been decided, as regards the Waterloo & City Line, though the experience gained on the Liverpool electric line would tend to show the great advantage of the latter.

With regard to the tunnels, there is perhaps no need to give any particulars of construction, etc.; they are of the regular Greathead form. The electric generating station will probably be erected at the Waterloo end, where land is not so valuable as in the city, whilst fuel may be obtained more easily and with less expense. No contracts, however, have as yet been entered into for supplying the equipment; indeed, these questions are not even settled by the directors. The only arrangement at present made is for constructing the tunnels from a point just outside the Waterloo terminal premises to the end of the line in the City close by the Royal Exchange. With regard to the City terminus, a point of some interest, will shortly come up for decision by the directors as to the approaches to the line from the street surface. The Waterloo line at present is designed with exits (*i. e.*, surface stations, where the hydraulic lifts are placed) at two different points in Queen Victoria street; but it has been proposed that instead of having these independent approaches to the underground platforms, the Waterloo line shall make use of the large central station close at hand, which the Central London Railroad intends to erect, in conjunction with the city authorities, underneath the open space or street area in front of the Mansion House, to serve as an approach to its own line 70 or 80 ft. below, and also to act as a convenient and safe street crossing, passageways being provided from the pavements or sidewalks across each street, so that foot passengers do not need to dodge through carts, cabs, omnibuses and other vehicles.

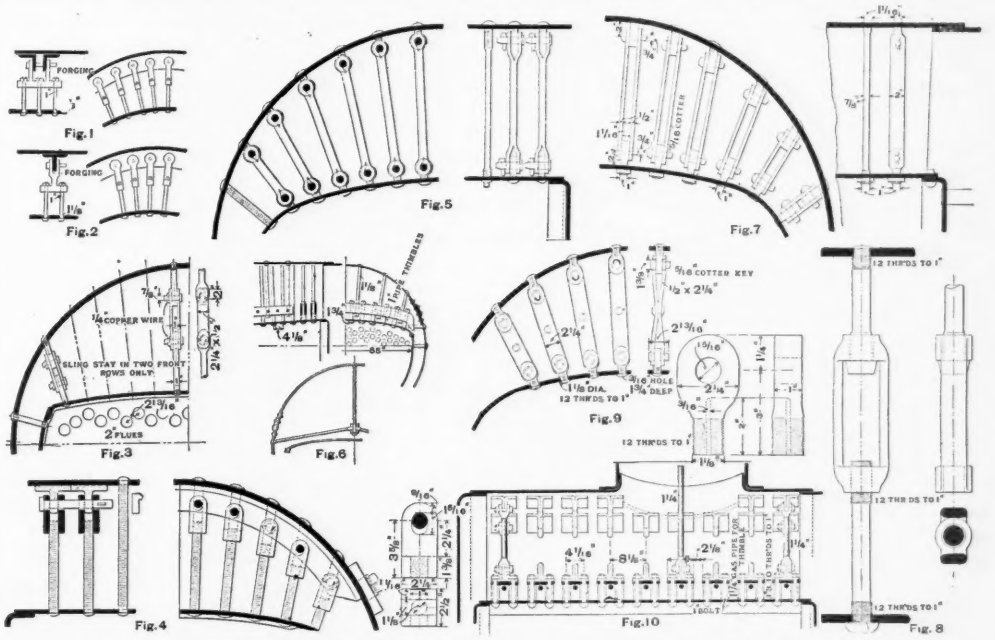
4. Of the other lines enumerated, there is not much to be said. The *Waterloo & Baker Street Railway*, as the skeleton map will show, passes from a point adjacent to the Waterloo & City terminus under Waterloo station, thence under the river Thames and by way of Northumberland avenue, Pall Mall, Haymarket, Piccadilly Circus, Regent street and Portland place into Regent's Park, curving round rather sharply into a terminus close to Baker street station on the Metropolitan Railway. It is said, though probably without much foundation, that this project had the support of Sir Edward Watkin on account of its giving facilities for transit across London to passengers arriving at Baker street as the terminus of the new trunk line to the North in connection with the Manchester, Sheffield & Lincolnshire Railroad. This may be so, and the development of the line to Waterloo may depend to some extent upon the early completion of the trunk line; but Sir Edward's recent resignation has had an influence on the lines with which he was connected that, so far, has only unsettled them, though it may ultimately be of great benefit. At any rate, nothing is being done to carry out the underground line at present.

5. *The Great Northern & City Railroad* may be summed up also in three words, *in statu quo*. This line will have special interest when it is once taken in hand, as it is designed to some extent for ordinary rolling stock, the tunnels being 16 ft. in diameter. There is actual connection at the Finsbury Park end with the Great Northern main line, and in this respect (*i.e.*, the matter of a junction with surface lines) it stands alone out of all the new lines underground. Of course, the idea is to detach the steam locomotives and run the trains into and out of the city by means of electric locomotives.

6. The last of the lines enumerated, the *Hampstead & Charing Cross Railroad*, has had rather an unfortunate experience. It is undoubtedly designed to serve an excellent purpose, and fills a want that has long been felt by the London public; but apparently the present moment is an inauspicious time for asking the public to support anything financially. The prospectus of this line was recently issued, and capital was invited for its construction; but so poor a response was received that the directors did not go to allotment. In one respect this result was beneficial, for an excessive amount of capital was proposed, and the hand of the promoter was too visible. This would, perhaps, account for the investing public giving it a wide berth. The mattter is now in better hands, and later on will come out in an improved form, when, perhaps, the money will be found. This line serves also to connect important points, and a small branch of it from Hampstead Road to St. Pancras is especially designed for the convenience of traffic from the big steam railroad termini at Euston, St. Pancras and King's Cross, down to Charing Cross.

In the skeleton map it will be seen how clearly the want of connection between many of these termini has led to the development of the underground lines. There is still much to done, however, in the way of perfecting a network capable of giving the convenient and rapid cross connections which are really wanted for transfer of passenger traffic across the central parts of London.

F. B. L.



Figures to Accompany Master Mechanics' Committee Report on Cracking of Back Tube Sheets.

Cracking of Back Tube Sheets.

We gave in our issue of June 22 a short abstract of the report presented by the Committee of the Master Mechanics Association on the tracking of Back Tube Sheets, together with an account of the discussion on the report. We now give a further synopsis of the report of the Committee and the engravings of types.

The purpose of the investigation was to find out if any particular form of boiler is especially liable to cracked tube sheets, and the conclusions arrived at are that radial stayed boilers carrying high pressure are more subject to cracked tube sheets than other types, and that this cracking is principally due to staying the crown sheet too rigidly at points near the flue sheet. Other causes assigned for this difficulty are the placing of flue holes too close to the flanges and high steam pressure. [The above conclusions refer only to radial stayed boilers of the wagon-top type as brought out in the discussion of the report.—EDITOR.]

The Committee reports a considerable unanimity of opinion as to the proper method to be followed to obviate the difficulty met with. This is, to make such a provision for the staying of the front end of the crown sheet as will give the requisite support, coupled with sufficient flexibility to allow for the expansion and contraction of the back tube sheet.

Various designs were submitted to accomplish the object sought, among which are those shown in the accompanying illustrations. Figs. 1 and 2 show a method submitted by Mr. Allen Cooke, of the Chicago & Eastern Illinois, said to be in common use abroad. Fig. 3 represents a design submitted by Henry Schlacks, Denver & Rio Grande, and Fig 4 a design by H. Roberts, Chicago & Grand Trunk. Fig 5 is furnished by the Schenectady Locomotive Works, and is in use on several roads. Fig. 6 is a design credited to the Pittsburg Locomotive Works. Fig. 7 was submitted by John McKenzie, of the New York, Chicago & St. Louis, Fig. 8, by A. W. Gibbs, Pennsylvania Railroad, Fig. 9, by A. Vail, Western New York & Pennsylvania, and Fig. 10 by John Player, Atchison, Topeka & Santa Fe.

The experience of Canadian roads is regarded as especially valuable as they have used radial stays for a considerable length of time, and long ago realized the difficulty presented. It is claimed that on these roads crown bars give better satisfaciton than sling stays for the first two rows of stays at the front end of the crown sheet. It seems to be the general opinion, however, that in making repairs, sling stays can be applied more cheaply, and seem to answer all purposes.

The Committee quotes at length from a paper read by Mr. Yarrow before the British Institution of Naval Architects in which are given the results of experiments on the boilers of a torpedo boat. A somewhat similar difficulty was encountered in this case and remedied by permitting the tube sheet to expand freely by means of stays working in stuffing boxes, and having a nut outside so as to take the tensile struss where required.

The Committee states that it is not prepared to fully indorse the conclusions set forth as to the proposed methods of cure, as they have been in use too short a time in this country to fully demonstrate their utility. As several of the methods shown have been quite extensively used in Europe, it is inferred that they have been found satisfactory there or they would have been discontinued.

Efficiency of Air and Foundation Brakes.

The following is an abstract of the discussion at the May meeting of the Western Railway Club of the paper on the above subject read at the April meeting by Mr. W. H. Marshall. An abstract of the paper was given in *Railroad Gazette*, May 11.

PRESIDENT FORSYTH: The most important thing that affects the brake power is the proper length of levers. I would like to ask any of the car men here how they get before their shop people just how to put in the proper length of levers. It is the easiest thing to make a mistake there, and unless there are someregular rules about it that shop men understand, the brake leverage will get wrong.

MR. SCHROVER: The practice on the Northwestern, so far as passenger cars are concerned, is to weigh each individual car, and make the adjustment according to the weight of that car. We have a standard cylinder lever and a standard brake lever. We use what is known as the Stevens system and the brake levers are all alike. The center holes are left to be determined by the weight of the car. One man figures all these leverages and applies the levers to the cars. It is made a permanent part of the brake rigging. Our practice was due to the fact that where a series of holes was used in the cylinder lever men after taking down the rigging always made a mistake in putting it up. At one time we used a series of holes and marked the car with its breaking capacity, depending on the men who had charge of the work to put the connection back where it belonged, but they would not do it, so we adopted the plan of making the cylinder levers a permanent part of the rigging, and it is riveted in place so that it cannot be taken out.

MR. MARSHALL: The constructionof the drain cup is radically wrong. It cannot be examined without taking it to pieces, and if you want to take the branch pipe out it is frequently necessary to begin at the triple valve and release every pipe joint between that and the train pipe. A trap should be used that could be taken out without taking the thing to pieces.

The train pipe pressure is not always 70 pounds. The friction of the packing, the tension of the release spring in the cylinder, and on the part of passenger cars the tension of release srings on the brake beams, and the friction in foundation brakes, are four sources of loss in power. It amounts to nearly 25 per cent. of the 50 pounds in the cylinder. We cannot increase the leverage on cars, because we know that when cars go out of the shops properly equipped and these losses are reduced to a minimum, we have all the brake power we can employ without sliding the wheels; nevertheless, some of these can be eliminated or reduced. The friction of the piston packing may be considerable if it is not in good condition. The friction in foundation brakes may be very great, if the levers are of improper lengths. The release springs on passenger cars should be taken off. This cannot be done on cars that are built and the brake so hung that gravity will not take the shoe from the wheel, but it can be done on all new cars and there is no reason why release springs should be used in passenger service if they can be avoided in freight. The release springs vary extremely in strength; in fact, I know of a case where they consumed 5,000 pounds in brake power. The strength of some of these springs varies from a tension of 50 pounds up to 330. In the case of 330 there was 2,640 pounds of brake power lost by the tension of the springs.

In freight service it is a mistake to use 70 per cent. of the weight; the leverage should be increased to 90. Some railroads do, and also use 90 pounds in the train pipe, and have no trouble with slid wheels, but when this pressure is carried the train must of course be handled carefully.

MR. SYNNESTVEDT: (Crane Co.) The drain cup mentioned has within it a cylindrical screen which forms practically a continuation of the inside of the train pipe, and this screen is inserted in a manner for allowing the dirt to pass through without going into the branch pipe to the triple valve. This is entirely wrong. In this way a car having an imperfect drain cup gets the dirt from many others. It passes from one car to the next one and when it comes to an imperfect cup it goes through the branch pipe and causes trouble in the triple valve. The very best cure for our disease of the drain cup would be to abolish it altogether and then put in a dirt collector which could be easily emptied.

PRESIDENT FORSYTH: The only way to solve that difficulty is to have a place for the sole purpose of collecting dirt and then a system of encouraging dirt to accumulate in that place and have it cleaned out at stated periods.

MR. BARNES: We now have all the brake friction we can use; therefore there is not a loss of brake friction, as we have all the friction we want at the present time. The cylinder release spring cannot be changed. The piston packing friction has been reduced as much as is possible, when the cylinders are well oiled. The foundation brake friction is as low as it can be made without using roller bearings or oiling the bearings. Taking freight cars, the three losses shown cannot be prevented. It is not safe to increase the leverage of brakes at the present time until the Committee on Brake Shoes has made a report, because on the mountain grades and places where they use hard brake shoes, you can run the pressure up to 100 per cent., but if you put on a soft shoe they would slip at 60 per cent. Until there is something like uniformity in brake shoes, it is not safe to increase the leverage on freight cars.

MR. MARSHALL: I did not recommend increase of leverage on account of the losses shown in the foundation gear and I only spoke of an increase of leverage on freight cars. It is now 70 per cent. and here are the conditions: take an ore train, each car carried 30 tons; they are often taken down from the mountain districts loaded with all they will carry. If the car is light, weighing 26,000 or 27,000 pounds and you take 70 per cent. of that instead of 90, any time that you want brakes with emphasis you have got a very small brake power in proportion to the load. When you are going up mountains the cars are light and then it doesn't make so much difference. I know of several cases where they have great trouble in controlling ore trains on the mountain grades, and yet they are using 70 per cent. instead of 90. Our experience has shown that we do not want the emergency on a freight train except when we have to have it, and we have a greater margin really on freight service in that view of it than we do on passenger, where we use the emergency more frequently. It is the general verdict also that even with the soft shoe there is no trouble in passenger service with using 90 per cent. of the brake power. A great many difficulties with slid wheels have been found to be due to a larger leverage than that.

MR. QUEREAU: If one assumes that the train pipe pressure is 70 pounds as a standard, well and good; but it is not the fact in actual practice. I have recently tested four locomotives taken from the road and with the train pipes presumably in the condition they have been running for months and the train pressure averaged from 75 to 80 pounds, in which case it has been found necessary to reduce it to bring it back to the standard. I think the majority of engines are carrying more than 70 pounds train pipe pressure and that this is one of the causes of slid wheels and not the 70 per cent for which the levers are calculated.

PRESIDENT FORSYTH: I do not believe the average pump governor governs within 5 or 10 pounds.

MR. SYNNESTVEDT: 70 per cent. of weight for braking power freight cars is too low, unreasonably low. One reason for setting that limit undoubtedly was the fact that there is great irregularity in pump governors which are now in service, but it is not a rational thing to put wrong leverage on a car because the governor is wrong. The proper thing to do is to rectify the governor and not use imperfect or improper leverage. In view of the fact that soft shoes are used on passenger cars on which a leverage of 90 per cent. is also used and no slid wheels result, where proper pressure is carried and the brake properly handled, a higher leverage could be used on freight cars, though I am not prepared to say that it would be proper to go as high as 90 per cent. I should, however, recommend 5 per cent. I think even for passenger service 90 is a little high, and I know many times, under certain conditions and certain kinds of weather, 90 per cent. with a reasonably full appliction, would result in slid wheels. On the other hand, I think 70 is altogether too low.

The Manhattan Arc Lamp.

The main features of this lamp are the subject of a patent applied for in 1887 by Mr. William Jandus. It has since then been worked out in detail, and as now perfected is controlled by the Manhattan General Construction Co., 50 Broadway, New York, and Monadnock Building, Chicago. The lamp was designed to secure few parts, low cost of repairs and operation, an enclosed globe to arrest sparks and keep out insects, a long life of carbon, a lamp regular in feed and positive in cutting out, susceptibility to artistic design, and, where desirable, an arc lamp that would burn at a high potential and small current. It is not our purpose to describe in detail the construction of the lamp, the external appearance of which is shown in the illustration. To secure all the features sought for necessitated a radical departure from ordinary types. The one form of construction by which it seemed possible to meet all the requirements is with all the mechanism concentric to the central stem, and the magnet, armature, clutch, mechanism, cut out device, globe and carbon holding frame have all been so arranged. The main line circuit runs through a switch in the cap, and to take down the lamp it is only necessary to give it a quarter turn when it drops out of the cap, leaving the circuit to pass uninterrupted. The wires enter the cap through inclined insulated openings, well protected against the weather.

Manhattan Arc Lamp.

It is claimed that the cut out arrangement is the most perfect ever devised It is called in service only in case of obstruction to the prompt descent of the upper carbon. In other cases the cut out is effected through the carbons themselves after they are consumed to the predetermined point. To shorten the lamp the customary carbon rod has been dispensed with, and a carbon holder feeding through the clutch rings with the bare carbon substituted. The feed is effected without any variation in voltage, due to a clutch feed which gives a smooth feed without the jumps common to other lamps. The objection to differential coil lamps of varying the voltage according to the temperature of the shunt coil is entirely avoided.

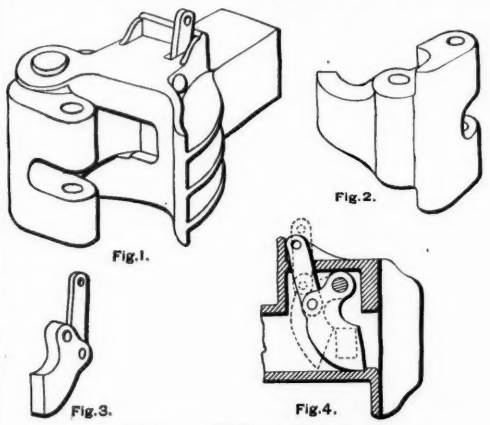
An important feature covered by the patent is the enclosed globe, air tight at all points except at the bottom which is closed by a pan. This makes trimming and cleaning of the globes possible without disturbing any air tight bearings, and it is claimed to be the only practicable method of preventing oxidation of carbons by closure that has yet been devised. On the formation of an arc the enclosed air is heated and rarified, the surplus air escaping through the lower vent. The contained oxygen is soon reduced by combustion with the carbon points to carbon monoxide, and this, with the remaining nitrogen, surrounds the arc and protects the points from further combustion.

These highly rarified glasses being much lighter than the surrounding comparatively cold air, have a tendency to rise, and finding no outlet at the top, remain in the globe to the exclusion of the surrounding air, which is much colder and heavier and which can enter only by slow diffusion.

The construction made it possible to cut down the length and reduce the bulky appearance of the lamp, giving it a much more pleasing exterior than is possible in the ordinary forms. The lamp shown here is designed to burn one week on half night service without trimming or renewal of carbons. A similar lamp is made to burn four nights for all night service. The saving of labor in trimming is an important element. It is estimated that the saving in the cost of carbons and trimming will amount to $10 or $12 a lamp a year. The main features claimed for the lamp are the great saving in trimming and the fact that ordinary carbons may be used, but the brief account that we have given indicates many other good points. The lamp is in service in the Jersey City station of the Central Railroad of New Jersey and in other railroad stations, and will be offered to railroads as especially desirable for station lighting where an attractive lamp is desirable, as well as for yards where the lamps are used over a considerable area and the item of labor in trimming becomes important.

The Williams No. 4 All Steel Coupler.

The illustrations show the construction and general appearance of a late design of coupler brought out by Mr. Dyer Williams, of Chicago. Fig. 1 shows the head of the coupler complete, fig. 2, the knuckle, fig. 3, the lock, and fig. 4, the position of the lock when the knuckle is closed. The dotted lines in fig. 4 show the position of the lock when the knuckle is free to open. It will be seen that the lock lies against the inner wall of the head and offers considerable surface to the tail of the knuckle which bears against it when the knuckle is locked. The lock is hinged upon a three-quarter inch pin and is controlled by a short link attached to it and projecting through the top



Williams All Steel Coupler.

of the head the lock drops by gravity to the locking position whenever free to move, and is prevented from moving too far by a small lug projecting from below. A small spring of $\frac{5}{16}$ inches crucible steel serves to throw the knuckle open.

All parts of this coupler are of cast steel manufactured by the Chicago Tire & Spring Company of Chicago, and it weighs, complete, about 195 pounds. A pulling test of a pair of these couplers made by the Solid Steel Company of Alliance, Ohio, on March 1, 1894, showed an ultimate strengtht of 179,000 pounds. In a guard arm test made on the same date at the works of the Chicago Tire and Spring Company, the Williams coupler stood three blows at 15 feet, while in a drop test made February 15, 1894, at the same place, the coupler stood three blows at 10 feet and 12 blows at 15 feet; the bar then cracked under the guard arm, the knuckle remaining in good condition.

Progress of the Strike.

As a matter of record we note the principal events in the railroad strike, and the accompanying disturbances, from the date last reported in our previous issue.

Tuesday, July 3.—Through passenger trains were run with a fair degree of regularity to and from Chicago on the Atchison, Topeka & Santa Fe, the Chicago & Northwestern, the Chicago, Burlington & Quincy, the Wisconsin Central and the Chicago, Milwaukee & St. Paul. The mob continued to rule at Blue Island, but not much violence was done. The Chicago & Northwestern suspended employees all over its system—to the number of 10,000 according to the reports—in consequence of the shrinkage in its income. The shortage of ice and fresh fruit and vegetables caused a good deal of concern at Chicago. The Chicago reporters printed a story about a possible conference between Debs and representatives of the Pullman Company and the railroad officers, but there was no basis for it. It was reported that officials of the Cleveland, Cincinnati, Chicago & St. Louis had told the officers of the American Railway Union that they would entertain a proposition for compromise, but the management of the road very soon denied the story.

The Wabash succeeded in delivering perishable freight in Chicago. Engineers, firemen, brakemen and trackmen on the New York, Chicago & St. Louis struck and a train load of passengers was left standing at 91st street in the midst of a swamp. The Chicago, Milwaukee & St. Paul had some trouble in consequence of a strike of firemen at St. Paul, and of yard men at La Crosse and Sioux City. All passenger trains of the Chicago & Alton were held at

Bloomington for want of firemen. A Baltimore & Ohio passenger train was derailed in Chicago. About 900 employees of the Wabash at Springfield, Ill., struck and the shops were closed. About 500 employees of the Chicago & Grand Trunk struck at Port Huron. A despatch from Boise, Idaho, reported that no trains were running on the Union Pacific, in consequence of strikes at the division terminals. At Terre Haute the Big Four and the Chicago & Eastern Illinois were both reported "tied up." The passenger trains of the Wabash were delayed at Peru and other points and air hose was cut.

The yard men of the Iron Mountain road at St. Louis struck on July 2, but returned to work on the 3d. The Denver & Rio Grande was reported as still completely tied up at Pueblo and Salida. Despatches from San Francisco reported ten overland trains laid up on the Southern Pacific at various points, some of them having been at a standstill since Friday, June 29. Officers of the Southern Pacific estimated that company's loss at $200,000 a day. Two hundred cars of fruit were badly delayed.

Wednesday, July 4.—The improvement in the movement of passenger trains at Chicago continued and the Chicago & Northwestern moved considerable freight. The Illinois Central ran its through trains but did not resume suburban traffic. The Superintendent of the Railway Mail Service at Washington concluded, from reports received, that the situation was greatly improved.

The United States soldiers held the mob at bay at Blue Island and other points in Chicago, but there was much lawlessness, nevertheless, on the Lake Shore and the Rock Island tracks in the region of the stock yards. A train carrying United States soldiers was cut in two six times by the mob, the crowd pressing around so that in each case the actual perpetrator of the deed could not be caught. Lake Shore passenger trains were badly delayed by this mob, which, it is said, was composed chiefly of idlers and very few strikers. An Erie train had the Pullman cars cut off from it at Hammond by a large mob, which, it is said, had gone there from Grand Crossing owing to the arrival of federal troops at the latter place.

At Blue Island the Chicago, Rock Island & Pacific was enabled to run trains for the first time in five days, all of them being guarded by United States soldiers. There were some arrests of strikers and sympathizers. Regular through passenger trains seem to have been run quite generally, but there were numerous cases in Chicago of engineers and firemen being intimidated, and delays were occasioned by the necessity of getting new men. United States soldiers were placed on guard at the Union Stock Yards, but there were not enough of them to thoroughly guard the premises.

At Bloomington, Ill., there were still 14 passenger trains of the Chicago & Alton held, about 2,000 passengers being detained. Six companies of Illinois militia were ordered to Mounds, near Cairo, to release Illinois Central passenger trains. At Indianapolis the strikers weakened, a strong force of United States marshals having been called out. Some freight conductors and a few others struck on the Chesapeake & Ohio and the Louisville & Nashville at Cincinnati. Passenger traffic was completely stopped on the Grand Trunk at Port Huron, Mich., by a strike at midnight of July 3. From Fargo, N. D., it was reported that no trains on the Northern Pacific had moved west of that point for a week. At Helena, Mont., the receivers of the Northern Pacific asked the court to discharge all employees quitting the service on account of the Pullman strike. At Denver it was reported that passenger trains were moving eastward and southward, but none westward. The Atchison was still much hampered by strikes in the yards at Pueblo, La Junta and Trinidad.

Thursday, July 5.—The mobs in Chicago continued their rioting, the military guard being too small. Many freight cars were overturned on the main tracks, some signal towers were burned and railroad workmen assaulted. At the stock yards there were determined efforts to move trains, but crowds of 5,000 to 8,000 men and boys surrounded every movement and prevented effectual work. The blockade of passenger trains on the Chicago & Alton at Bloomington was raised, with the aid of United States marshals, new firemen being secured. The movement of passenger trains to and from Chicago was reported much improved. At Litchfield, Ill., cars and buildings of the Wabash were set on fire and burned up. Sheriffs and non union railroad men were refused food at many places. One striker was killed by a pistol shot by a railroad police officer in Chicago, who had to defend himself from the mob. A passenger train of the Pittsburgh, Fort Wayne & Chicago was stopped by a crowd at Fortieth street, Chicago, and all the passengers and trainmen compelled to get off. The mob then derailed the engine.

Governor Altgeld, of Illinois, sent a telegram to President Cleveland protesting against the presence of United States troops in Chicago, but the President sent a firm answer, reminding the Governor of the duty of the local authorities to preserve the peace in Chicago.

United States troops were ordered to various points on the Union Pacific. There was considerable interference with trains by strikers at Cincinnati and an injunction was issued by the United States Court in that city. Eight passenger trains of the Big Four were stranded at Mattoon, Ill. Militia were placed on guard at Sioux City, Ia., and passenger traffic there was resumed with regularity except on the Chicago, St. Paul, Minneapolis & Omaha. It was reported from Detroit that the strike was spreading, some switchmen and freight handlers having left work. Strikers seized a passenger train of the St. Louis, Iron Mountain & Southern, near Little Rock, and derailed the engine. There was also trouble on the Little Rock & Memphis, and Governor Fishback, of Arkansas, ordered out troops. Trouble began in Alabama, and the Kansas City, Memphis & Birmingham took off its night passenger trains. A number of trains were stopped or badly delayed by strikers at Memphis. About 40 strikers and others were arrested at Trinidad, Col., for resisting arrest and disarming United States marshals. Engineers and other trainmen of the New York, Chicago & St. Louis struck at Fort Wayne and trains were forcibly detained.

In California the situation continued serious. United States troops were posted at Oakland, but were unable to repress the law breakers who destroyed property and drove off enginemen. On Wednesday the State troops at Sacramento had refused to obey orders and laid down their arms, and on Thursday five companies of militia at Oakland assembled at the armory and declared their sympathy with the strikers. At Willows, Cal., the officers of the Southern Pacific ordered the track torn up to prevent the passage of a train which had been started by strikers for their own convenience.

Friday, July 6.—The mobs continued their operations in Chicago, and, in fact, became much more rampant. On the tracks of the Pittsburgh, Cincinnati, Chicago & St. Louis near Forty-fifth street, 225 freight cars were burned between 6 and 8 o'clock in the evening. The incendiaries were accompanied by a crowd of 4,000 men, women and boys, and they went wherever they pleased regardless of the inadequate police forces on the ground. At Hawthorne on the Burlington road, 7 miles out of the city, a mob of about 300 men burned a number of cars. At Elsdon, on the Chicago & Grand Trunk, 500 cars were burned in the evening. A mob of about 500 held sway all day in Kensington, Grand Crossing and vicinity and 200 cars were burned, including some passenger cars and Pullman sleeping cars. More troops were ordered out and the total force of soldiers and police in and around Chicago was estimated at 10,000. The town of Pullman was guarded by state militia. The people of Chicago became generally alarmed.

The Illinois Central succeeded in releasing large quantities of perishable freight which had been held at Mounds and sent out some freight from Chicago. The Baltimore & Ohio ran no trains north of South Chicago. The American Railway Union ordered a strike at Cleveland and freight work in the yards of all the roads there was almost wholly suspended. At Indianapolis lawlessness continued and a cattle train was derailed. The Wabash was still unable to run any trains to or from Fort Wayne and similar, but indefinite reports came from other points on that road east of St. Louis. Ogden and Salt Lake were reported entirely cut off from the outside world, all through trains being discontinued and no mail having arrived for several days. At Ogden the United States marshal and his deputies were forcibly ejected from an engine.

The mobs still kept traffic at a standstill in California, the military power being insufficient to effect the movement of trains.

The switchmen of the Hannibal & St. Joseph at Kansas City struck, this being the first strike of importance on the Burlington system. The Chicago & Alton had no trains to or from Kansas City. The Kansas City, Fort Scott Memphis was unable to do any freight business.

Saturday, July 7.—The mobs in Chicago grew bolder, being encouraged by the insufficiency of the police and militia and the forbearance of those on duty. At 49th and Loomis streets a company of state militia guarding a wrecking train was stoned by the mob and finally defended themselves by a volley from their muskets, wounding about 25 men and some women and boys. This was at 4 o'clock in the afternoon. Four hours later the mob gathered again. At Ashland avenue, on the Chicago & Northwestern the police had to use their pistols to repress a mob, and a young woman on a roof near by was killed. Passenger trains were reported running to and from Chicago with considerable regularity. The Lake Shore and the Atchison ran regular mail trains. The Pennsylvania Lines, however, ran no trains into or out of Chicago. The Chicago & Erie ran no trains on either Friday or Saturday.

It was estimated that 75 per cent. of the manufactories in Chicago had been closed on account of lack of fuel or materials. The fire department of Chicago reported 62 alarms within a period of 24 hours. Many fire alarm signal boxes were broken by the mob. Traffic was still blockaded at Memphis, at Anderson, Ind., Lincoln, Neb., and Frankfort, Ind. At Sioux City, Ia., passenger trains were resumed but freight was still blocked. The Toledo, St. Louis & Kansas City road ran nothing but mail trains.

California continued to be subject to the rule of the mob. A few local trains were run out of Los Angeles on the Southern Pacific and the Atchison started a through overland train but the military force, both state and national, was inadequate and the railroads could do very little. At Oakland there was lawlessness similar to that in Chicago, the main tracks being blocked with freight cars. At Sacramento in consequence of the weakness of the state militia on Wednesday, the strikers and their friends ruled the city. They secured 800 rifles and defied the federal troops. Fruit growers in the Sacramento Valley suffered great losses on account of their inability to send fruit east. From Trinidad, Col., it was reported that the wholesale arrests made, and the presence of United States troops had enabled the restoration of railroad service.

General Schofield, commanding the army, took possession of the Northern Pacific as a government railroad and ordered it opened by the troops.

Sunday, July 8.—On Sunday there was not much trouble in Chicago, and through passenger trains seem to have been run with considerable regularity. There was trouble on the Pittsburgh, Cincinnati, Chicago & St. Louis at 22d street, however, a freight car being set afire and the main track blocked. The marshals had to open fire upon the mob and one rioter was killed. Three victims of the riots of Saturday died. A mob burned a switch tower on the Burlington road at 16th street. The incendiaries continued active at the Union Stock Yards, cars being set afire in a dozen different places. At Hammond, Ind., rioting was renewed. Large numbers of freight cars were overturned upon the track and a passenger train of the Louisville, New Albany & Chicago was stopped and placed on a side track by the mob. United States troops were called out from Chicago and fired on the crowd, killing one and wounding four. At Danville, Ill., nineteen empty box cars were burned and a mob stoned a Wabash engine. A report which seems to have come from an officer of the Pennsylvania Company, states that 667 of that company's cars had been burned at Chicago, besides many signal towers and other small buildings. One hundred of the burned cars were loaded.

The situation continued serious in California, although things were quiet at most of the prominent points, the railroads making no attempt to move, in view of the size of the mobs and the insufficiency of the military protection. The soldiers who mutinied at Sacramento on the 4th were court-martialed, most of them pleading guilty and offering the excuse that they had been underfed and were exhausted by the heat. At Sprague, Wash., a mob stoned the special train carrying two companies of militia, ditched the cars in front of it and ran a car of oil on the culvert east of the town and burned it. The trestle west of the town was also burned after the train had crossed it.

The suspension of freight traffic in consequence of the strike at a score of division terminals within a radius of 500 miles of Chicago was reported upon in the despatches of Sunday, but it is difficult to make up from them any clear account of the situation. At Topeka the situation on the Atchison was greatly improved. At Salt Lake "everything was tied up and business was paralyzed"; the locomotive engineers discussed a strike, but were undecided. A large amount of accumulated mail was moved from Brazil, Ind. Passenger trains were moved to and from Detroit by the Wabash, but freight was still blocked. At Sioux City it was believed the trouble was over. At Kansas City a freight car was burned by a mob. Nearly all the roads at that city moved some freight. At Cairo seven strikers were arrested; the State troops were near by and trains moved without molestation. The Toledo, St. Louis & Kansas City moved some freight. The Atchison, Topeka & Santa Fe started mail from Santa Fe, N. M., for the first time in eight days. At Van Buren, Ark., day passenger trains were reported running, but night trains with Pullman cars were laid up. Thirteen firemen were arrested "for refusing to go out with Pullman cars." At Memphis trains were run under the protection of the police. At Columbus, O., the freight trains of the Hocking Valley road had to be protected by a sheriff.

The aspect at Birmingham, Ala., was so threatening that Governor Jones of that State ordered out four companies of militia to guard the Union passenger station. A bridge of the Chicago & Great Western was burned at South St. Paul, Minn.

At the General Managers' Association in Chicago, it was given out that the Chicago, Milwaukee & St. Paul was running all freight trains and that the Northwestern and the Burlington were in good condition. The Pittsburgh, Fort Wayne & Chicago moved some perishable freight. About one-third of the Chicago & Alton passenger trains were running. The Chicago & Grand Trunk succeeded in clearing up some of the tracks in the city. The Michigan Central and the Nickel Plate could do nothing on account of the obstructions at Hammond. The Chicago & Calumet Terminal was doing nothing at all. The Big Four was blockaded at Kankakee.

Monday, July 9.—On Monday there was little disturbance in Chicago, the principal news being that the unions of a large number of workmen in a great variety of trades voted to strike on Tuesday. President Cleveland issued a proclamation applying to California, and the States in the far northwest the same as that sent to Chicago the day before. The officers of the American Railway Union ordered a strike at Toledo, and, according to, the press despatches, succeeded in calling out several hundred freight men on the Lake Shore and a similar number along the line of the Ohio Central. As, however, freight is very light on the principal roads, in consequence of the blockade at Chicago, it is hard to decide how much weight should be given to these reports about men "going out." This applies also at Cleveland. A good many of the switchmen seem to have struck there, but little or nothing is said in the despatches about the effect of the strike on traffic, and it is safe to say that it was not startling.

From various points in Indiana and Illinois there were reports of all kinds, some of men going back to work and some of men striking for a second time. The firemen and switchmen on the Big Four seem to have some grievances of their own. The Michigan Central notified employees to report for work at once or consider themselve discharged. Striking coal miners or railroad men burned a bridge 120 ft. long on the Union Pacific, Denver & Gulf, near Victor, Col. The mob continued to control in California, but President Cleveland ordered men from the navy yard to assist the military in opening the railroads.

Tuesday, July 10.—On Tuesday through passenger ser-

(*Continued on page 497.*)

RAILROAD GAZETTE

EDITORIAL ANNOUNCEMENT.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The great strike carries one very plain lesson. It is that men who choose to stop working are still under obligations to keep their hands off the persons and property of other men. Organized bodies of strikers have so long and so universally been allowed to burn, beat, and even kill, that the trade unions, and indeed many other honest people, have come to think that a striker has some special privileges of lawlessness. He supposes that the orders of his leaders are a sort of letters of marque, under which he can carry on war against society without being a pirate and without the liability to be hanged, or even to "get 30 days." This befuddlement afflicts many others than the workingmen—even editors, ministers and men who are relied on to make or administer laws. If the experience of these disastrous days teaches governors, sheriffs, mayors and any great number of citizens that strikers, as well as those who wish to work and as well as those who risk their savings in ventures that make work for men, are subject to the laws all the time—that striking is not a holy revolution—that a striker should be imprisoned for assault or arson and hanged for murder—it will have been worth part of its cost. There probably is no secret, undiscovered way to prevent strikes; enforce the laws always and promptly, and let men strike. The complexities of the matter will then get themselves untangled in time, and in the best way for everyone.

Another lesson is that the money cost of a strike is not borne only by the railroads, the corporations or the rich. But this lesson will come a little later, when Chicago and Cook County have to pay a few millions for property destroyed. Unfortunately, the mass of the taxpayers and wage earners will not know that they are bearing this burden, but they will carry it all the same. There will be a vast loss that the railroads, the packers and the other great companies cannot collect at law; but the actual destruction of property the city and county can probably be made to pay for, and it is a public duty to make them pay. No doubt peace is much more carefully preserved now in the neighborhood of Pittsburg because Allegheny County had to pay some millions for her slowness in 1877. Railroads generally seem to be timid about bringing suits of this sort, probably because it is an "unpopular" thing to do, but they have a great duty now. It is the duty of all citizens to stop the rush toward anarchy, and nothing will do so much good as to bring the pains of this rebellion home to those who encouraged it by trifling with the rioters. So far as we can judge, the Chicago railroads are better prepared than they ever were before to help teach people that it costs money to have a demagogue for a mayor and an anarchist for a governor.

The strike now coming to an ignominious end was as uncalled for as any one that we remember. So far as the railroad companies go, it was thrust upon them, and primarily they had no responsibility for it whatever; and yet there is a certain remote responsibility resting upon the officers of the railroads for any strike occurring among their employees, and this is a good time, perhaps, to think a little about that responsibility. We mean the obligation resting upon railroad officers to secure good men and maintain high discipline. Obviously, it is the duty of the officers in control to avoid strikes by all reasonable and honorable efforts at conciliation. The General Manager or Superintendent is, in the nature of things, a wiser man and more temperate in speech and in judgment than the employees, and he has to overlook some foolishness, and even impudence on their part; and, sad to say, the proportion of silly employees and vain, and even wicked, labor leaders is always shown to be very great. But it is the officer's earlier duty to get the best men he can, and so make it harder for Debs and his like to stampede his force. It seems to us that even now, while the smoke still hangs over the field, we can see some signs that the quality of the men was different on the different railroads concerned, and that some of them stood the pressure with more courage and sense than others. The press despatches, speaking of the Burlington road, give as a reason for its comparative freedom from the "tying-up" process, that it is "not a Brotherhood road." But that is not much different from saying that the men are so intelligent that they know better than to join or to sympathize with such a weak and silly brotherhood as the American Railway Union. And this means that they have been selected with more regard to their intelligence and moral character than is usually the case. The switchmen were the worst class in this, as they have been in previous Chicago strikes. Their behavior in that city and at Buffalo, in 1892, justifies the opinion that their ranks contain more incipient rioters than any other class of railroad men. But experience shows, especially in Chicago, that a railroad cannot afford to harbor a rioter in any branch of its service, and the only rational way of interpreting this lesson is to conclude that men of good moral character must be sought for as carefully in selecting a switchman as in hiring men for any other department. If the switchman's work is so hazardous or disagreeable that it will cost more to get a good man for that work than it would to get a man to run a passenger train, it would not be unbusinesslike to pay more for switchmen than for conductors, although that would violently disturb a very ancient tradition. We do not know just how the Burlington has made out to get better men than the other roads (if it has), but the only recipe for the purpose that we have ever known to find favor with experienced managers is the same that has been set forth in these columns a great many times—good discipline everywhere and long tenure of office for the officers. Good discipline, thoroughly enforced, will increase wages if wages are too low; and it is necessary to keep division superintendents in their respective offices with a good degree of permanence in order to insure the selection of the most suitable men for the rank and file.

The reduction of the freight car mileage-rate, agreed upon by the roads west of Chicago, which was noted in our traffic columns last week, will be an important reform—if it works. Probably these roads, as a whole, borrow more cars from the East than they lend, and so may have been more ready to reduce the rate from 7½ mills a mile to 5 mills than the roads east of Chicago will be to acquiesce in the arrangement. But the change will undoubtedly be made by the Western roads, as among themselves, even if exceptions have to be made in the case of some objecting roads; for the main object, of course, is to reduce the cost of running private owners' stock cars. These cars are as plenty as tramps in the Western territory. Most or all of the roads have long since given up trying to use their own stock cars, and they pay out thousands of dollars for the "patent" cars, half of which money, more or less, really constitutes a heavy rebate to the shipper on the freight bill for the cattle carried in the cars. Stock cars always make quick trips, thus earning large sums in a short time, and their use is an illustration of the violent inequalities often produced where an average is blindly depended upon to work out justice. As a matter of fact, an arbitrary rate per car mile for all kinds of service at all seasons of the year can hardly be expected to be equitable in any case, except where both or all parties are both borrowers and lenders in proportion to the business done. The unanimity of the vote for the half-cent rate indicates that there are now no time contracts with owners of "patent" stock cars—which, by the way, are often patent only in name, and are generally used in precisely the same way that other stock cars are used, the cattle being fed and watered at stopping places. On the other hand, the reference to a committee of the question concerning the rate on refrigerators, indicates that there *are* still some contracts in existence for paying high rates on that class of cars. Why would it not be a good thing for the Interstate Commerce Commission to publish some of the private car contracts? Then the roads which conduct this business fairly could be known and distinguished from those which allow themselves to be bled.

President Cleveland's Intervention.

In our last issue we called attention to the policy of the railroad officers in the present strike as being the only rational and logical course to be pursued in emergencies like this, and events occurring in the past week make the point more clear and unavoidable. That policy is for the railroads to assume the burden of running trains, but not that of enforcing the law. They are entitled to and they have claimed the protection of the law in the discharge of their corporate duties and in the enjoyment of their corporate rights. When they were prevented by riotous demonstrations and acts of violence from carrying on their lawful functions, a case at once arose where they were entitled to governmental intervention for removing criminal obstruction to their corporate obligations. They have rested in this position, and the Government has responded to the call for protection and is now engaged in the function, essentially governmental, of restoring order, suppressing crime and preserving the peace.

The public interest has thus shifted from the strike to the contest between law and lawlessness. And in such a contest it is plain on which side are the sympathy of the public and the promise of victory. Large as the question of such a strike is, it merges in the infinitely larger question whether law or lawlessness shall prevail in the country. It is no longer a question between employer and employee. It is now one between good order and mob violence. The appeal to force necessarily clears the field of every other remedy. If arbitration be advocated on the ground that it will avert bloodshed, violence is then made the alternative of settlement, and a settlement becomes the price of peace. No Government can afford to make a truce with crime, or avoid its responsibilities upon such conditions.

While in emergencies like the present we should not hold the constituted authorities to a finical construction of their powers, it is the part of calm judgment and sound patriotism to see to it that Federal intervention is not only justifiable, but inevitable. This is the spirit of the Constitution under which we live. We have carefully inquired whether the action of the President in employing the military forces of the United States is sustained by the circumstances. A cursory glance at the source of his authority confirms the presumption that his action was sound.

The second article of the Constitution of the United States vests the executive powers of the Government in the President, makes him the commander-in-chief of the army and navy of the United States, and of the militia of the States when called into actual service of the Union. He is solemnly required to take care that the laws be faithfully executed.

The fourth article calls upon the United States to guarantee to every State in the Union a republican form of government, and to protect each of them against invasion. The citizens of each State are entitled to all the privileges and immunities of citizens in the several States. The right of the people to be secure in their persons, houses, papers and effects against unreasonable searches and seizures shall not be violated. And no State shall deny to any person within its jurisdiction the equal protection of the laws.

These are the highest and strongest and most solemn guarantees of our public and private life. Their enforcement is peculiarly the function of the Federal government.

The laws passed by Congress, while they add nothing to these rights, specify the remedies or illustrate the occasions whereby such rights may be vindicated. If it be a State whose immunities are threatened, its need of Federal assistance must be evidenced by its Legislature, if in session; otherwise, by its Executive. If private persons appeal for succor, it must first appear that a right under the Constitution or laws of the United States is involved before the President can act. The local authorities are presumed to afford ample protection to those within their jurisdiction, and a reasonably plain case is required to justify the employment of Federal forces. The President is to exercise his just discretion in all such cases, and the responsibility for action rests upon him, and him alone. Before proceeding to harsher measures, he is required to issue a proclamation of warning that all opposing the laws should disperse within a limited time. If this be not obeyed, the use of force and arms becomes then not simply a right, but a duty, vested in the Executive of the nation.

In the present case, an unusual event in the history of such interventions in times of general peace has occurred. The Governor of Illinois has protested against the action of the President, on the ground that the occasion has not arisen when he could lawfully act; that, so far from the Governor inviting

Federal assistance, he has protested against it. The country has been treated to the unusual spectacle of the President and a Governor of a great and powerful State engaged in a constitutional argument, and that by telegraph.

The Governor has shown himself a poor patriot and a worse lawyer. He overlooked the fact that the President is specially vested with authority to call out the militia, even of Illinois, and certainly the military forces of the United States, whenever, by reason of unlawful obstructions, combinations or assemblages of persons, it shall become impracticable, in his judgment, to enforce, by the ordinary course of judicial proceedings, the laws of the United States within any State or Territory. It therefore became a simple question for the President to determine whether the exigency had, in his judgment, occurred, allowing and requiring the exercise of this powerful function on his part.

The undisputed facts were that the United States marshals were unable, in the discharge of their duties, to cope with the forces arrayed against them. The processes of the Federal courts were, under the circumstances, entirely inadequate to the occasion. Interstate commerce, exclusively regulated by Federal law, was interrupted by violence. The property and persons of citizens of other States were subjected to unlawful detention and danger. The transit of the mails was impeded, or altogether stopped. The State authorities could not, or would not, adequately provide for the emergency. A perfect case was made out for the interposition of the forces of the United States. The President would have fallen below the expectations of the country had he done less than he did, and short of his duty had he longer delayed.

Nor did he act without ample precedent. It had been the practice of the government almost from its foundation to allow the military forces of the United States to be used in subordination to the Federal marshals when deemed necessary in order to enforce the process of the Federal courts. While the practice had become established and was generally useful, there was no express warrant in the statutes for it. It involved a delicate and dangerous power, and the use of it was discontinued, by special enactment of Congress, in 1878, leaving, however, unimpaired and unaffected the constitutional prerogative of the President, as we have pointed out.

We need go back no further than the time of President Hayes to find exact precedent for the action of Mr. Cleveland. On three separate occasions, and in as many different states, Mr. Hayes employed Federal troops to put down lawlessness similar to that existing at Chicago. And every president since his time has had occasion to resort to the same prerogative. They were supported in such proceedings by careful opinions of successive attorneys general of the United States, and, best of all, by the inevitable requirements of the hour and the common approval of the country.

When, in Mr. Hayes' term, the collector of internal revenue in Baxter County, Arkansas, met with organized and armed resistance, Attorney General Devens advised the President that a case then arose which required Federal troops to enforce the execution of the law. Attorney General Brewster, in 1882, advised Mr. Arthur that he had ample authority to suppress, by United States troops, lawlessness in Arizona. And Mr. Harrison was advised to the same effect on more than one occasion by his constitutional adviser.

Courts of the highest authority have frequently recognized this power in the Executive, and, whatever may be said by persons interested in maintaining a contrary position, it must be clear to every dispassionate mind that Mr. Cleveland has acted in this trying occasion, not only within constitutional limits, but with commendable moderation, forbearance and dignity. And we all have the more confidence in the perpetuity of our government.

The Progress of Railroad Reorganization.

Considering the general depression, the heavy decrease in railroad earnings, and the disposition of capitalists to wait for a turn in the situation, the progress of the reorganization movement during the last week or ten days has been gratifying. No new plans were brought out; the development consisted of the completion of details in those already published and the formulation of others.

The Atchison plan has now been before the public for several weeks. It was not until last Saturday, however, that any opposition was organized. This consists of a committee of which ex-Comptroller Theodore W. Meyers is Chairman. The committee is dissatisfied with the heavy assessments, promises a plan much more equitable to stockholders and second mortgage bondholders, and calls for a deposit of stock and a support of bondholders. The move is not considered of great importance, as the plan is well under way, and, having a support of European capitalists, will probably go through; but the opposition may cause delay. The most the committee can reasonably hope for is a reduction of the assessment on the stock. Already there is talk of a reduction from $12 to $10. The interest on the first mortgage will be in default, subject to immediate foreclosure, unless paid July 20. In order to prevent such action, a syndicate has been formed to advance money to pay the interest. It will be reimbursed from the assessment, under the plan, as soon as the first installment of $3, which is shortly to be called, is paid in. Mr. Stephen Little, expert accountant, who has been examining the books of the company, is expected to make his report this week, after which a balance sheet will be published.

The New England Reorganization Committee is cooperating with the receivers, who got authority from the courts to issue $500,000 receivers' certificates. The Reorganization Committee advanced $330,000 cash for an equal amount of the issue, with which to pay the January interest on the first mortgage. This action prevented a foreclosure. The balance of the sum authorized, together with certificates issued on a previous occasion, has been, or is now to be, used by the receivers, under the sanction of the Reorganization Committee, to make needed improvements on the road and rolling stock. The certificates will eventually be taken up by the cash received from the assessment. The Reorganization Committee now controls $4,000,000 of the $5,000,000 second mortgage bonds, and 95 per cent. of the stock.

The foreclosure sale of the East Tennessee, Virginia & Georgia, on Saturday, and the calling of the last assessment on the first and second preferred and common stocks of that company, and on the common stock of the Richmond Terminal, payable July 23, are the last steps in the reorganization of the Richmond Terminal system. The task has been a very difficult one; at one time it was thought to be practically impossible. Messrs. Drexel, Morgan & Co. are responsible for the successful conclusion. That firm is also financeering the Erie plan, and will probably take a prominent part in the Reading reorganization.

The Northern Pacific tangle has grown more complicated. The Adams Committee, so called, which claims that it is not working in the interest of Henry Villard (an unqualified assertion to the contrary is made by its enemies) is gaining in strength. It represents all classes of bonds, and is endeavoring to secure assents from a majority of each, so that its certificates against the same can be listed on the New York Stock Exchange. The oppostion to this movement did not take tangible form till last week, when Mr. Johnston Livingston, in the interest of the Brayton Ives party, headed a committee organized in behalf of the third mortgage bondholders. It is so late in entering the field that it is probable it will meet with considerable difficulty in securing assents. The Adams Committee, which is handling the many intricate details of the situation in a masterly way, is growing stronger daily. It has little fear of withdrawals, for the reason that it is charging $3 per $1,000-bond deposited, to defray expenses.

A call has been made for a deposit of Union Pacific securities. The Government debt will have to be settled sooner or later, and such settlement cannot be made except by interests directly representing security holders. Another reason for the calling of deposits is to utilize time. It is said that the committee has proof that the deposits will be large.

Of other minor reorganizations, the Georgia Central plan is due at any day. Minneapolis & St. Louis, owing to a confirmation of the order of foreclosure by the Supreme Court of Minnesota, under the Rock Island ownership in the improvement and equipment mortgage, amounting, principal and interest, to $3,000,000, will soon be forced to either satisfy this claim or submit to a foreclosure. Inasmuch as there are $9,796,700 stock and $6,213,000 bonds involved, some of which would necessarily be sacrificed under foreclosure, it is probable that the Reorganization Committee, which has been in existence for a year or more, will put out a plan which it has had under consideration. This plan provides for a consolidated mortgage, of which only a sufficient amount will be issued to satisfy the improvement and equipment mortgage. The committee is now holding sessions daily.

The Toledo, Ann Arbor & North Michigan plan will probably not be out before August 1. The bondholders have been asked to deposit their bonds in support of the committee with the Central Trust Co.

Judge Ingraham's decision in the Erie bond case has had good effect upon London holders of that company's securities, and will render the final perfection of the plan much easier than would otherwise have been the case.

The Railroad Bond Market in June.

The railroad bond market for the month of June reflects the business situation very strikingly. All of the substantial issues of solvent lines have shown advances, due to a quiet, steady domestic investment demand. This buying has been prompted by the cheapness of money and the business depression which checks investment in industrial enterprises, while it is still desirable to put one's money in an interest-bearing medium on which quick realization can be made when business revives.

The issues of the receivership roads, taken as a group, declined on an average 2.72. The course of these bonds was conditioned almost wholly upon reorganizations, actual or contemplated. It reflected considerable liquidation, and a discounting of the readjustment which has taken place. Early in the month Europe became a heavy seller of the receivership railroad stocks. This extended to the bonds and materially weakened prices. A secondary effect was the shaking of foreign confidence which, coming at about the July interest period, called home large sums of money, which was paid in interest and dividends instead of being reinvested it in this country. This lessened the demand for the better issues, narrowing the market in those securities to a quite local basis.

After the payment of July interest it is usual for a good demand for first-class securities, which can then be bought on an ex-interest basis, to spring up. This tendency, together with the low prices at which these securities are selling, would naturally find expression in higher values during the month; but against that we now have the great strike.

The average changes by groups is given in the table which follows:

Receivership group	declined	2.72
Grangers "	advanced	.39
Trunk Line "	advanced	.46
Southwestern "	declined	1.02
Transcontinental group	advanced	.33
Coalers	advanced	.82
Southern	advanced	.62
Miscellaneous	advanced	.30
Average whole list	declined	.10

From this it will be seen that all but two of the groups advanced fractionally, viz., the receivership group and the Southwestern group. These declines were so heavy as to make the average decline for the whole list 0.10.

The causes which affected prices of the receivership group are numerous and individual, but nevertheless of the same general nature; the issues of a single road or system advancing or declining, according to the treatment which they have received at the hands of the courts in the matter of the payment of interest, or by reorganization committees in readjustments.

The Atchison 4s, of which $1,590,000 were sold during the month, were firm under the publication of the reorganization plan. They are practically to stand. The seconds, which constitute the "A" and "B" bonds so called, are to be converted into incomes to receive their interest if earned. This is regarded as decidedly unfavorable, and although they partially discounted in previous months such a disposition, they declined 4¾ points. Colorado Midland 4s dropped 6¼ points on the proposal to cut the principal down two-thirds. Atchison 2ds to amount of $2,101,000 were sold during the month; this was largely liquidation. Atantic & Pacific 4s declined 2½ on the proposal to scale their interest. The St. Louis & San Francisco bonds, comprising six issues, all showed substantial advances upon the order of the court to pay past due interest as soon as earned. These issues were not affected by the Atchison reorganization plan. The movement of these various issues of the Atchison system, in view of the plan, furnish an object lesson for holders of securities of other insolvent roads which, up to the close of the month had been partially acted upon, and it is probable that, during July, it will be further discounted.

The Erie 1sts and 2ds showed advances upon Judge Ingraham's decision, which makes more probable the completion of the reorganization.

Each month served to complicate the tangle in Northern Pacific affairs. The firsts were strong upon the action of the Consolidated 5's Bondholders' Committee to pay the interest, thus preventing a default which would forfeit, to the preferred stock, its lien on certain land east of the Missouri river. The other issues, with the exception of the Terminals, were weak, the junior liens suffering severely. The belief has grown into a conviction that this latter class will stand very little show in the reorganization, and the depreciation in prices during the month, as is shown by the table, indicates that this condition had not been fully discounted. The Consolidated Bondholders' Committee, which has been in the field some time to secure assents for protective purposes, made application to the Stock Exchange to have its certificates issued against bonds deposited listed. It stated that something over $11,000,000 of these had assented. The Governing Committee declined to list the certificates until such time as the committee could show an assent of the majority of the bonds outstanding. The total issues is something over $46,000,000. Wisconsin Central, which is another of the Villard systems, scored the banner decline in its firsts during the month. The first sale was at 60, which is a decline of 11 points from the last previous sale in May. Subsequent sales

brought the price down to 51, a net decline of 20 points. This movement was in discount of the modest request of the management to the holders of the firsts to fund their coupons for several years practically without any offsetting compensation. The incomes declined a net 6 per cent., and are now selling at 9, which figures indicates that they are practically worthless and that a reorganization would be apt to wipe out their value.

The Peoria, Decatur & Evansville 1sts advanced 5 points on the prospects of a speedy reorganization favorable to that issue.

The various Reading issues were a feature of the market, $1,411,000 par value being traded in during the month. There was very little liquidation in the transactions and some investment buying. However, for the most part the trading was of a speculative nature. Philadelphia is a believer in the Reading property, and whenever there is a weakness in the various issues under about the current figures there are Philadelphia buyers in the market. Indications now are that the receivers will put out a reorganization plan in the Fall which will stand some show of being adopted. No attempt will be made before that time to reorganize the property.

The Richmond Terminal issues all showed strength upon the reorganization which has been completed. Values of the system are now thought to be on a rock bottom basis and the number of its friends in Wall street are growing daily.

One of the receivership systems, whose issues have suffered severely, has been that of Union Pacific. The seventeen issues of this system quoted in the list netted an average decline of 5 per cent. Early in the month London, Amsterdam and Boston started a liquidation of the stock which lowered the price about 5 per cent. The movement extended to the bonds and was based upon the belief that the system would suffer even more in the reorganization than had the Atchison system. An additional cause of the weakness was the probability that there is no hope of getting a funding bill through Congress at this session. Until the Government acts upon its debt, no intelligent action toward a reorganization can be taken.

The Southwestern group was weak in sympathy with the stock market. These issues can hardly be called first class. They experienced considerable liquidation at the hands of timid holders. The Wabash Company decided not to pay interest on its debenture "A" bonds. These are largely held by the Goulds and Mr. Sage and in Europe.

The Anthracite coal issues all showed strength, which was based upon the general excellent investment character, and the fact that the month's coal business will be the heaviest in the history of the companies.

The Granger group filled much of the investment demand. The buying in the choice issues was comparatively heavy. Burlington 7s were traded in to the extent of $335,000; Rock Island extension 5s $540,000; the debenture 5s $286,000, and other issues to a less amount.

The Trunk Line issues were firm because of influences operative, as stated. Despite the deficit of $725,000 after interest in New York Central for the June quarter and $711,000 for the year, the bonds of that system showed an advance. This was due to the fact that the dividend comes after the bonds, and if the earnings of the road in the future continue to fall off, dividends and not bond interest must suffer.

The Miscellanous group was somewhat irregular, being controlled by special conditions. The Brooklyn Elevated issues scored sharp declines, owing to continued bad earnings and sharp competition by the trolley lines. The industrial bonds for the most part were either stationary or showed advances. Chicago Gas Light and Coke and People's Gas and Coke were strong in sympathy with the stock. The United States Cordage was strong on good buying. During the last few days in May there was some liquidation, but it was stopped through a ready absorption of the stock and a sharp advance movement set in.

Rio Grande Western 4s were weak for a time, as it was thought they would not pay their interest for July, but it was advertised and the bonds rallied.

The sales of the active bonds during June, par value, were as follows:

Atchison 4s	$1,590,000
" 2ds	2,101,000
Austin & Northwest 1st	102,000
Ches. & Ohio gen. 4½s	209,000
" " con. 5s	90,000
Chic., Bur. & Quincy 7s	235,000
Chic. & Nor. Pacific 5s	463,000
Chic. Gas. Light & Coke 5s	169,000
East Tennessee gold 5s	113,000
Kansas Pacific 1st con	238,000
Kansas & Texas 4s	244,000
" " 2ds	179,000
Mobile & Ohio gen. 4s	221,000
Northern Pacific 1st	99,000
" " 2ds	310,000
" " con 5s	376,000
N. J. Central gen. 5s	209,000
N. Y. Ont. & Western ref. 4s	223,000
N. Y., Chic. & St. Louis 4s	174,000
Oregon Ry. & Nav. 1sts	104,000
Oregon Short Line 6s	523,000
Rock Island Ext. 5s	540,000
" " deb. 5s	286,000
Reading 1st incomes	269,000
" 2d "	205,000
" 3d "	323,000
" 4s	534,000
Rio Grande Western	273,000
Rich. & W. Point Ter. 5s	200,000
Texas & Pacific 1st	151,000
" " 2ds	372,000
U. S. Cordage 1st	654,000
Union Elevated 1st	422 000
Union Pac. Den. & Gulf 1st	139,000
Wabash 1sts	272,000
" 2ds	191,000
West Shore 4s	376,000

The International Railway Congress.

So far as we learn the railroads of the United States are still taking but languid interest in the International Railway Congress which is to meet in London a year from now. The Pennslyvania Railroad has long been a member of the Congress. We learn that the New York Central, the New York, New Haven & Hartford and the Richmond, Fredericksburg & Potomac have joined this year. We had hoped that many others would join, for it costs but a trifle in cash, and what it will cost any member in the expenditure of time and mental energy depends entirely upon the zeal with which he enters into the affairs of the Congress. We will not take the space to repeat here what we have said before as to the scope of this organization and as to the desirability of representation by American railroads, Those who are not familiar with the Congress may find a brief statement of its objects and work in an editorial printed in the *Railroad Gazette* of April 6.

We have received the detailed lists of questions sent out by some of the reporters. One of these comes from Mr. J. A. F. Aspinall, Chief Mechanical Engineer Lancashire & Yorkshire, Horwich, Lancashire, who reports on the subject of Express Locomotives. He will consider the type most suitable for high speeds, the use of high pressure and of compounding, improvements in distribution and balanced slide valves, the relation of locomotive design to the strains on the permanent way and the special effect in this particular of compounding. The questions which he sends out seek for very full and specific information as to the type of engine used on any given road for express traffic, with dimensions, weights, fuel and water consumption, speed, grade, train load and performance. We shall be surprised if Mr. Aspinall's report does not make a very valuable paper.

Mr. Frederick Harrison, General Manager London & Northwestern, Euston Station, London, reports on the interesting topic of Organization, the scope of his report being central administration and outdoor staff on the various systems of different countries. We trust that he will get a considerable body of information from the United States, and will analyze it as part of his report. He has an opportunity to do a work for us that nobody has yet undertaken, but we fear that he will be appalled when he comes to study carefully organization in the United States. He has a comparatively simple job in reporting upon his subject for the United Kingdom and for the continent of Europe.

Mr. Henry Lambert, General Manager of the Great Western, Paddington Station, London, reports on Acceleration of Transport of Merchandise, and will consider the influence of speed upon cost of hauling and upon the investment necessary in rolling stock and other plant. This is a matter which has lately interested a good many acute railroaders in the United States, and it will be a pity, if they do not take a hand in the discussion; although they are not likely to make much of a figure in the report itself, for that will probably deal with the subjects under conditions very different from any that exist here.

The production of anthracite coal during the month of June was the heaviest in any one month in the history of the trade. The corrected returns of shipments, which are usually about 92 per cent. of the production, have not yet been made. However, returns for the four weeks of the month commencing with the 2d and covering 25 days' operations, are at hand, and show a shipment of 4,830,573 long tons. This is an increase over the month of June, 1893, of 1,000,707 tons, and an increase over the allotment, which was fixed at 60 per cent. of the then known capacity, of about 2,000,000 tons. This extraordinary movement, at a time when business of all kinds is at the minimum, is obviously due to the bituminous coal strike which forced consumers of soft coal to use anthracite. It was figured by the sales agents at one of their recent meetings, that the demand from this source through the month would amount to fully 1,000,000 tons. The output, minus that amount, would be about equal to that made in June last year. The current production of coal does not go directly into consumption, especially at this season of the year, as it is shipped to distributing points in preparation for the Fall and Winter demand. Contrary to the usual rule, the great bulk of the June production went to the consumers at once. The movement westward during the month, via Buffalo, was 385,000 tons, and there was a heavy demand from the line trade. The decision of the anthracite sales agents to restrict the production during the month of July to 60 per cent. of the capacity, instead of making another new record, is further proof that the soft coal strike, now over, was responsible for the large June production. The railroads have received considerably less per ton on coal freights (the rate being 40 per cent. of the selling price) this year than last, but the loss in rates on June business is more than offset by the increase in tonnage.

The sale of a controlling interest in the Lake Street Elevated Railroad is a very important transaction not so much from the amount of money involved as from its bearings on the transportation interests of Chicago. The purchase was made in the interests of the Yerkes properties, the North Chicago Street Railway, the Northwestern Elevated and the West Chicago Street Railway, and places under their control a competitor which has given considerable trouble especially to the Northwestern Elevated Company. The Lake Street Company has for some time had a right of way across the line over which the Northwestern proposed to enter the down-town districts and was interfering greatly with its plans. It was also competing successfully for traffic in the territory of the West Chicago Street railroad, and was contemplating a branch on the north side which would have interfered with the plans of the Northwestern Elevated road and cut into the traffic of the North Chicago Street railroad. Under the circumstances the move was probably a good one for the Yerkes interests. Whether the public will gain anything by the transaction is another question. North side transportation is now practically in the hands of Mr. Yerkes and his associates, as it has been for several years past. The same might be said of the West Side, except for the West side Metropolitan, which expects to operate its main line before the end of the year. It is reported that the Lake Street Company has secured a right of way east on Lake street to Wabash avenue and hopes now to secure an extension south on Wabash avenue to connect with the "Alley" Elevated. Whatever may be the outcome of the matter, the Lake Street Elevated is in strong hands, and less difficulty may be experienced in securing funds for improvements than has heretofore been the case.

The London *Economist* calls the Atchison reorganization plan monstrous. To begin with, nothing is known in regard to the actual position of the company, which remains in the hands of those under whose guidance it has again fallen into a disastrous plight. The bondholders are once more asked to carry the heavy end of the log, and no provision is made for better management in the future. Not a word is said as to the condition of the property, and the bondholders are asked to walk by faith in those who have done nothing to command their confidence. The English bondholders' committee is severely criticised and its chairman has resigned, disgusted with its performance. He does not consider the proposed income bonds a satisfactory substitute for the present second mortgage, and the "effectual control" suggested is legally impossible and impracticable. A mortgage bond with fixed interest and power to foreclose is to be exchanged for an income bond without such fixed interest or power. The *Economist* does not see that the scheme has one redeeming point.

Every little while the statement is made that the Canadian Pacific is about to introduce the use of electric locomotives on its Kicking Horse grade. It is quite possible that this will be done. Indeed it might be safe to say that it is probable, but the matter is still far from settlement. It is not certain that a sufficient water supply can be had during the winter months, and studies have yet to be made as to the practicability of impounding enough water.

NEW PUBLICATIONS.

The Effect of Brakes Upon Railway Trains. By Captain Douglas Galton, C. B., etc. Reprinted, with a Preface, by the Westinghouse Air Brake Co. Pittsburgh: 1894. Octavo, 218 pages, numerous plates.

In 1878 a series of experiments was conducted on the London, Brighton & South Coast Railway by Captain Douglas Galton and George Westinghouse, Jr. Since that time these experiments have become known the world over as the Galton-Westinghouse experiments, and have revolutionized men's ideas as to the laws of friction without lubrication; Captain Galton has become SirDouglas Galton, K. C. B., and the name of George Westinghouse has become a household word in all civilized lands. Notwithstanding the importance of these experiments and the profound effect which they have produced on certain mechanical applications of science, the record of them has for years been almost inaccessible. One could find it complete only in the *Transactions* of the technical society before which it was read in the form of Papers, and only fragments had ever been published in the technical journals. The *Railroad Gazette* published considerable extracts from the reports as they appeared originally, as did *Engineering* and perhaps *The Engineer*, but so far as we know these were the only places in which one could find this valuable material unless he were so fortunate as to possess the numbers of the *Transactions* containing them, or excerpts in pamphlet form of which few were printed. Now, however, the Westinghouse Air Brake Co. has reprinted in full the original reports, with all the plates, and in order that the plates might be engraved clearly they have been largely, if not entirely redrawn, The result is that this invaluable document is now available in much handsomer and more convenient form than ever before.

The record consists of three papers by Captain Douglas Galton, the first being a paper read by him at the Paris meeting of the Institution of Mechanical Engineers, June 13, 1878; the second he read before the Institution at Manchester, October 24, 1878, and the third in London, April 24, 1879. The third paper is prefaced by a a description by M. George Marié of some brake experiments upon the Paris, Lyons & Mediterranean Railroad with the Westinghouse and the Smith vacuum brakes; and with all the papers the discussions before the Institution are printed in full and in their proper order.

The history of the Galton-Westinghouse experiments is interesting. A paper on Brakes was presented before the Institution of Mechanical Engineers, and during the discussion Mr. Westinghouse stated that he had observed a very marked difference in the friction of the shoes upon the wheels at high speeds and at low speeds. He believed that a determination of the facts was of great importance and offered to design and construct the necessary recording apparatus, and to carry out a series of experiments under the direction of any person whom the Institution

might appoint to supervise the tests and report. Captain Douglas Galton was appointed and personally supervised the experiments. The London, Brighton & South Coast Railway put a locomotive and brake van at the disposal of Captain Galton and Mr. Westinghouse and gave every facility for conducting the experiments.

These experiments first established conclusively the very important facts that the co-efficient of friction between a brake shoe and a wheel falls as the speed of revolution of the wheel rises, and also that it diminishes in some ratio to the duration of the time of application. These facts, and especially the first one, have now become common property and are fundamental in the art of braking; that is, all schemes of adjusting brake shoe pressure must be made with regard to the fact that the higher the speed the lower the co-efficient of friction.

The time has now come when it seems very important to make more practical application than has been made heretofore of this law, and when, moreover, railroad mechanical officers are disposed to learn more of the effects of material, speed and time of application on the results got out of brakes as well as upon the wear of shoes and wheels, and their future investigations will go on from where Galton and Westinghouse left off. It is interesting to record that for these experiments Mr. Westinghouse designed an accurate and efficient method of automatically governing the pressure on brake shoes.

In the preface prepared by the Westinghouse Air Brake Company, an effort has been made to determine an expression for the relation between the co-efficient of friction and the speed, the data for this being taken from the tables in the Reports. The controlling considerations are that as the speed increases the co-efficient decreases, but with gradually less rapidity, and as the friction between the brake shoe and the wheel could not become absolutely zero at any finite speed, however great, the co-efficient of friction varies from that of rest to zero, when the speed is infinite. The mathematical form of expression fulfilling these conditions is $f = \frac{a}{1 + bV}$ in which f denotes the co-efficient of friction, V the speed in miles per hour, and and b are constants to be determined from the mean value of the co-efficient of friction given in the tabulated results of the actual trials. Applying the method of least squares to the mean observed values, it is found that the most probable values of these constants are a=.326 and b=.03532. Substituting these quantities in the equation, a table has been computed giving the co-efficient of friction at speeds varying from zero to 100 miles an hour, which co-efficient varies from .326 at zero miles up to .072 at 100; but this table of co-efficients is given of course only tentatively, and as applying only for cast iron shoes on steel tired wheels.

The results of the experiments which bear upon the relation between the co-efficient of friction and the time of rubbing of the brake shoe on the wheel, are too limited to permit a similar tabulation for various speeds, but it seems now to be probable that the relation between the co-efficient of friction and the time of application is very different with different materials, and it is suggested that it may be desirable to choose a material for brake shoes which causes the friction to decrease as the time of rubbing is extended, and so offset in some degree the increase of the co-efficient due to the increase of speed. This is one of the important matters that the Master Car Builders' Association has set out to investigate, along with the durability of different materials.

Progress of the Strike.

(*Continued from page 493.*)

vice was generally resumed on all Chicago lines and suburban passenger train service was almost in its normal condition. Freight service was still hampered, but a number of trains of fresh meat were taken out from the stock yards and cattle taken in. General Manager Egan stated that the general resumption of through passenger traffic was effected with new men protected by the troops. He held that if the military were withdrawn the situation would be as bad as ever. Debs, Howard, Rogers and a number of other officers of the American Railway Union were arrested at Chicago and held in $10,000 bail on indictments issued by the federal grand jury. They were charged with felonious conspiracy, unlawfully inciting riot against the citizens of Illinois, and interfering with the mails. Several others were also arrested.

The railroads at Cleveland succeeded in doing some freight business and the strike there appeared to have broken down. The disturbances on the roads entering Toledo and on the Big Four seemed, however, to be a little worse than on Monday, but it was difficult to judge by the press despatches. At Buffalo where a strike had been loudly threatened, the reports indicated that no action of any consequence would be taken. From Ladd, Ill., it was reported that United States soldiers guarding a passenger train of the Chicago, Rock Island & Pacific shot and killed two rioters who stoned the train. The disturbance here seems to have begun among the coal miners, and the rioters belonged to that class.

The situation in Colorado was said to be rapidly clearing up. Five companies of federal troops were scattered along the Union Pacific line in Wyoming. Through night trains were resumed on the principal roads out of Kansas City. The Burlington at that point handled enormous quantities of dressed beef for the Atlantic seaboard. At St. Louis it was reported that freight was moving about the same as before the strike except on the Wabash. Boycotts of non-union men by merchants and householders were reported from railroad division terminal towns in various parts of the country, even where the strike itself did little harm. A freight train of the Chicago, Rock Island & Pacific was wrecked near Utica, Ill., the alleged cause being malicious loosening of spikes. From Terre Haute it was reported that the Big Four was running passenger trains only, station employees in the freight department having been laid off. At Indianapolis, the Big Four freight firemen on the St. Louis and Cincinnati Divisions left their work, and freight traffic was reported blocked.

The situation in California continued critical, Sacramento having been terrorized by the strikers for twelve days continuously. The Southern Pacific opened its Coast Division and a through eastern passenger train left Los Angeles, the first over that road since the strike began. The clearing of the blockade at Sacramento and at Oakland was awaiting the arrival of United States military and naval troops.

Railroad Statistics for 1893.

The Interstate Commerce Commission has issued an abstract of the statistics of the railroads of the United States for the year ending June 30, 1893, the full report having been submitted but not yet being published. We give below some of the principal figures which we have extracted from the text and tabulated in convenient form:

	Miles.
Total miles	176,461
Increase over 1892	4,898
Second track	10,051
Sidings and yard track	42,043
Total track	230,137
	Number.
Locomotives	34,780
Increase	1,652
Cars	1,273,946
Employees	873,602
Increase	52,187
	Dollars.
Total capital	10,506,235,416
Capital per mile	63,421
Stock	4,668,935,418
Funded debt	5,225,689,821
	Per cent.
Stock paying no dividends	61.24
Mortgage bonds paying no interest	10.93
Income bonds paying no interest	82.56
	Number.
Passengers carried	593,560,612
Passenger-miles	14,229,101,084
Tons carried	745,119,482
Ton-miles	93,588,111,803
	Dollars.
Gross earnings	1,220,751,574
Increase	49,344,531
Operating expenses	827,921,299
Increase	46,923,303
Available for dividends	111,058,034
Decrease	4,907,157
Surplus	8,116,745
Decrease	5,919,311
	Number
Employees killed	2,727
Employees injured	31,729
Passengers killed	299
Passengers injured	3,229

TECHNICAL.

Manufacturing and Business.

The Pohle Air Lift Pump is being put in place at Turner, Ill., on the line of the Chicago & Northwestern Railroad. Alexander E. Schnee is General Sales Agent at 215 Broadway, New York.

The new car wheel plant of the North Carolina Car Co., of Raleigh, N. C., is expected to be in full operation in September. The main building of the new plant will be 82x172 ft. The machinery is now arriving at Raleigh and part of it has been installed.

The Rhode Island Locomotive Work have placed a mortgage for $300,000 on its plant at Providence, R. I., with the Rhode Island Hospital Trust Co., as trustee.

The Whiting Foundry Equipment Co., formerly the Detroit Foundry & Equipment Co., is now operating its new works at Harvey, Ill. The main office of the company has been removed from Detroit to 225 Dearborn street, Chicago.

The Hinckley Brake Co., has just received an order to equip 150 hopper bottom gondola cars building by the Jackson & Woodin Co., of Berwick, Pa., for the Delaware & Hudson Canal Co., with Hinckley brake slack adjusters.

The Kansas City Car & Foundry Co., has been organized to build a car wheel and cable pulley factory at Armourdale, near Kansas City. The stock is owned principally by William McMillan, W. N. McMillan and W. K. Bixby, of the Missouri Car & Foundry Co., of St. Louis. It is expected that the plant will be completed in about four months.

The Keystone Bridge Works, Pittsburg, have been on double turn for some time past. An extra force was put on July 9, large orders from New York having been received, among them one for iron for the addition to the Hotel Savoy.

Fires were lighted in the mechanical department of the National Tube Works, at McKeesport, Pa., on July 9, and preparations made for a resumption in that department the next morning. The strike at the works has lasted eight weeks.

The Craig-Reynolds Company of Dayton, O., is now erecting for the C. C. C. & St. L. two sets of gates to protect street crossings at Mattoon, Ill., which are 1,200 feet apart; the gates to be connected with and operated from a central power house. The gate company in accepting this order is agreeing to do a job that has never probably before been attempted by any manufacturer of crossing gates, but it undertakes it under a five years' guarantee to the railroad company. The Craig-Reynolds gate is already in use on this railroad at Ekhart, Ind., and its success there has led to the order just referred to.

The C. W. Hunt Company of 45 Broadway, New York City, has recently designed machinery for an interesting bit of work for the Brooklyn City Railroad Company which operates an extensive system of trolley roads in Brooklyn, N. Y. The fuel for the boilers of the southern station of this company has to be carried a distance of 1,000 ft. from the wharf to the boilers. The system which has been built enables the company to take the coal out of the hold of the vessel at the wharf and deliver it to the boilers at a cost of three cents a ton.

I. A. Williams & Co. of Utica, N.Y., and Chicago have been appointed agents of the United States Head-Light Co. for the sale of locomotive, electric, cable and other headlights, maufactured by the company.

Iron and Steel.

The McIntyre Iron Company, of Albany, N. Y., was charted at that city last week. The company will operate in the Adirondack region and will manufacture iron, steel and lumber. The directors are Robert W. Robinson, New York City, James McNaughton, and J. Mc. N. Thomson, of Albany.

The Carnegie Steel Co., Limited, has purchased 30 acres of land adjoining its plant at Duquesne, Pa., and expects before the close of the year, to erect a large addition to the plant. Plans for the addition have been prepared.

New Stations and Shops.

The R. F. Hawkins Iron Works, of Springfield, Mass., has been awarded the contract for building the new shops of the Boston & Albany Railroad in West Springfield for $86,000. There were 14 bidders. The work is to be completed by January 1.

The shops of the Atlantic & Danville now located at Portsmouth, Va., are to be removed from that town to some other point on the line about the beginning of next year. The new shops, it has been supposed, would be erected at Lawrenceville, and it is now stated that the railroad company has agreed to build at Lawrenceville if that town will subscribe $5,000 towards the expense of removal.

New shops to cost $75,000 are being erected at Tamaqua, Pa., by the Tamaqua Mfg. Co.

The Rodger Ballasting System.

The system of ballasting railroads as practiced by the Rodger Ballast Car Company is being introduced into England by James H. Lozer & Son, Moorfields-Chambers, Finsbury Pavement, London, E. C. The system has been adopted by the Great Western Railway, of England, the Glasgow & Southwestern, the New South Wales Government railroads and the South Australian and Queensland Government railroads.

The New York & New Jersey Bridge.

One of the results of the meetings of the commission to inquire into the matter of the span of the New York & New Jersey bridge is the demand for positive knowlege of the nature of the bottom of the river in the region in which a pier must be placed. Accordingly, borings are now in progress under the general direction of Prof. C. B. Brush, of Hoboken.

Fast Tunnel Driving.

Mr. Charles H. Jacobs, Chief Engineer in charge of the work of driving the tunnel under the East river, for the East river Gas Company, reports the following progress made during the week ending June 27, 1894.

Day shift	48.6 Feet
Night shift	53.6 "
Total progress for week	101.0 Feet.

This is remarkable work under the circumstances, and considering the difficulties encountered, thought to be as the quickest tunnel driving on record. The general foreman directly responsible is Mr. G. B. Fry, rock superintendent of the work. The heading is 10 ft. 6 in. x 8 ft. 6 in., and is advanced full section. The rock encountered was bornblende gneiss, very hard. Four 3⅛ in. Ingersoll-Sergeant drills are used in the heading, mounted on tunnel columns with arms, two drills on each column. About 15 holes, 9 to 10 ft. deep, are drilled by each shift, consisting of five machine runners and their helpers. Compressed air for running the drills and pumps, and also for ventilation is supplied by an Ingersoll-Sergeant compressor, of the latest improved piston inlet type, straight line pattern, having cylinders 20 in. diameter, by 24 in. stroke, furnishing about 1,050 cu. ft. of free air per minute.

THE SCRAP HEAP.

Notes.

A Buffalo paper states that the New York Central has issued an order forbidding the employment of a father and his son on the same locomotive.

The Buffalo, Rochester & Pittsburgh has restored the 10 per cent. which was taken off the wages of a large number of the employees on March 15.

Two freight sheds 600 ft. long belonging to the Mobile & Ohio Railroad, at Cairo, Ill., were burned on July 6. The fire was believed to be incendiary.

From Reading, Pa., it is reported that a number of employees of the Philadelphia & Reading have been discharged because they belong to a brotherhood.

Some trainmen on the Lehigh & Hudson Railroad have had their pay increased. The employees of the Panama Railroad have had their pay reduced 10 per cent.

Canadian Pacific trains began running through to the Pacific coast on July 5, about 42 days from the beginning of the flood which caused the blockade in British Columbia.

Mr. O. A. Jordan, Division Superintendent of the Michigan Central, at Jackson, Mich., has been arrested for violation of the alien labor law. Mr. Jordan's clerk acted in the same capacity for him when he was located at St. Thomas, Ont., and it is charged that a contract was made for him to come into the United States, in violation of the law.

In Denver on the night of July 1, a locomotive engineer of the Atchison, Topeka & Santa Fe, who was to run a train starting at midnight, was not called and overslept two hours; and this little circumstance, according to the newspapers, "agitated the whole Santa Fe system" because just now enginemen are staying at home for the purpose of "tying up" railroads.

Two track repairers were badly hurt near Nashville, on the Louisville & Nashville, a few days ago, by a rail which flew up when they took it out of the track in the course of repairs. By the expansion due to the heat of the sun the rail was so compressed endwise that when the spikes were loosened and the ends were moved laterally the rail tended to take the form of a bow, and sprung out with violent force.

About 500 tramps, the remnant of a Coxeyite band, seized a freight train of the Chesapeake & Ohio, in Kentucky, on July 7. The officers of the law were promptly on hand and it is said that the band was dispersed into three States. At Massillon, O., on the 5th, some striking coal miners endeavored to take possession of a freight train of the Wheeling & Lake Erie and one of them was fatally injured by a stone thrown by the conductor.

The old passenger station of the New York, New Haven & Hartford, at New Haven, a landmark in that city since 1848, was burned down on the night of July 4. This station stood over the track, resting on the walls of the cut through which the line runs at that point, and the space beneath, occupied by trains while receiving and discharging passengers, was one of the darkest places this side of Calcutta. The station was abandoned for railroad purposes in 1876, on the completion of the building now used. The fire blocked the main line about 12 hours.

The Boston rapid transit railroad law is to be voted upon by the voters of that city on July 24, their decision of approval or rejection to be final. People seem to still be in the dark as to whether the bill passed by the legislature will be of any benefit to the public. It provides for an elevated and an underground railroad, two systems which have no useful connections with each other. It provides for the construction of elevated railroads, either the Meigs or some other, except those of the ordinary type like those in New York, from Charlestown to Dorchester, via Dock square, Congress and Federal streets and Dorchester avenue; from Somerville to West Roxbury, via Dock square, Devonshire street, Chauncy street, Harrison avenue and Washington street; from Cambridge to Jamaica Plain, via Charles street, Park square and Tremont street. This is the Meigs plan, with certain extensions to South Boston, Brookline and points on the northern side of the city. The city is empowered to construct subways or tunnels from the junction of Tremont street and Shawmut avenue to Causeway street, and to acquire a strip of land from the southern entrance of the subway or tunnel to Franklin Park, and to build a bridge over the Charles river, to be used in conjunction with this municipal rapid transit system.

The Rules of Interchange.

Mr. John W. Cloud, Secretary Master Car Builders' Association, The Rookery, Chicago, announces that the revised Rules of Interchange will be ready for distribution about July 20, and will go into effect September 1. They will be furnished at the prices heretofore charged. Those who wish copies of the revised Rules, with special printing on the cover, should advise the Secretary promptly.

Changes on the Pennsylvania in Twenty Years.

The removal of the general offices of the Pennsylvania Railroad from the buildings on South Fourth street, Philadelphia, so long occupied as the company's headquarters, to the new portion of the Broad street station, was accomplished this week. The building occupied by the Pennsylvania Railroad before the South Fourth street building was built, is now used by the Lehigh Valley Railroad. This second removal of the Pennsylvania offices has given occasion for the publication in the Philadelphia papers of some interesting facts in the history of the company since it first occupied for its offices the building it has now outgrown. The company moved its office to that location in March, 1872. The length of lines embraced in the system was then 6,000, their aggregate capitalization $40,000,000 and the yearly earnings $25,000,000. To-day it owns 8,800 miles of single track, the share and bond capital approaches $815,000,000, the annual gross earnings average from $135,000,000 to $140,000,000, and the net earnings $40,000,000. Of the directors in that year, President Roberts and A. M. Fox now serve in that capacity. Mr. Roberts was then fourth Vice-President. Mr. Fox was one of the directors appointed by the city of Philadelphia when it had a voice in the company's counsels. The other directors were J. Edgar Thomson, Josiah Bacon, Wistar Morris, Washington Butcher, Edward C. Knight, Samuel T. Bodine, John M. Kennedy, Joseph B. Myers, John Rice, George Black (of Pittsburg), William Anspach and G. Morrison Coates. The officers of the company were J. Edgar Thomson, President; Thomas A. Scott, First Vice-President; Herman J. Lombaert, Second Vice-President; Edmund Smith, Third Vice-President; Thomas T. Firth, Treasurer; Joseph Lesley, Secretary, and William J. Howard, General Solicitor. Two years later Thomas A. Scott became President, George B. Roberts was promoted to First Vice-President, Edmund Smith was Second Vice-President, A. J. Cassatt, Third Vice-President, and Bayard Butler was Treasurer. In the next few years the present officers of the company came to the front. In June, 1874, Frank Thomson, who was Superintendent of Motive Power, shortly after the occupancy of the Fourth street buildings, was made General Manager to succeed Mr. Cassatt, and soon after John C. Sims became Assistant Secretary. In March, 1876, Strickland Kneass, J. N. Du Barry and John P. Green were appointed assistants to the President, and in July, 1879, John Scott was made General Solicitor.

President Roberts' administration began in June, 1880, and A. J. Cassatt became First Vice-President. Nine months later John C. Sims became Secretary of the company, and in October, 1882, Mr. Cassatt's resignation necessitated another change, Edmund Smith becoming First, Frank Thomson, Second, J. N. Du Barry, Third, and John P. Green, Fourth Vice-President, while Charles E. Pugh was appointed General Manager. In January, 1887, Robert W. Smith became Treasurer and George E. Peabody, Assistant Treasurer. The retirement of Edmund Smith on June 30, 1888, made room for the elevation of Frank Thomson to the First, J. N. DuBarry to the Second, and John P. Green to the Third Vice-Presidency. In March, 1893, on the death of Mr. DuBarry, Captain Green was made Second Vice-President, Charles E. Pugh, Third Vice-President and S. M. Prevost, General Manager.

LOCOMOTIVE BUILDING.

The Southern Pacific has under consideration the letting of a contract for building about 30 locomotives. The officers state that it will be decided within two weeks whether the contracts for any of the engines will be awarded at the present time.

The New York, Susquehanna & Western has given an order to the Rogers Locomotive Works for eight freight locomotives, the delivery to be made in six weeks.

The Schenectady Locomotive Works have received an order from the Maine Central for twelve mogul, five passenger, and three six wheel switching locomotives.

CAR BUILDING.

The Lehigh Valley car order has been awarded, as announced two weeks ago, to the Buffalo Car Mfg. Co., and the Lebanon Mfg. Co., each company contracting to build 1,000 cars. The cars are to have a capacity of 60,000 lbs. each, and are to have King's hopper bottom. They will all be equipped with M. C. B. couplers, air brakes, iron brake beams, and will be mounted on Fox pressed steel trucks.

BRIDGE BUILDING.

Bellevernon Pa.—The Bellevernon Bridge Co. was chartered at Harrisburg, Pa., on July 9, to construct a bridge across the Monongahela river from State street, Speers, Washington County to Main street, Bellevernon. The capital stock is $1,000. W. C. Jutte of Pittsburg is President and Augustus Jutte and James Buchanan both of Pittsburg, directors.

Belleville, Ont.—The County Council has decided to rebuild Wyman's bridge, at a cost of $15,000, and also Gordons' bridge. Mr. English is chairman of the Roads and Bridges Committee.

Columbus, O.—Citizens of Milo, a suburb of this city., have asked the County Commissioners to compel the Baltimore & Ohio, Cleveland, Akron & Columbus and P. C. C. and St. L. Railroad companies to replace two old bridges on Cleveland avenue with new structures. The cost will be about $12,000 if the companies are required to build new structures.

Lexington, Mo.—The United States Senate has passed a bill authorizing the construction of a bridge across the Mississippi river at Lexington, Mo.

Norristown, Pa.—The next grand jury will be asked to pass favorably upon the petition for county bridges to replace structures washed away in Mill creek by the May flood. They were located near Bryn-Mawr and at Chadwick's mill and would cost about $3,500.

Paisley, Ont.—Dr. McArton is receiving tenders for the erection of a steel bridge over the Teeswater river at Paisley, in two spans, one to be 120 ft. over truss and one 50 to 60 ft. under truss; price for each length required separate. Contractors to furnish their own plans and specifications.

Philadelphia, Pa.—The Board of Surveyors has approve the plans of the Wyoming Avenue bridge over Frankford creek, the new Falls bridge over the Schuykill river and the Torresdale avenue bridge over the Pennypack creek. The plans of the Falls bridge provide for a double-decked steel structure, but only the lower deck will be built at present. It will be 560 ft. long and 43 ft. wide, and will be 28 ft. above the water line. The appropriation for the structure is $300,000 and it is to be completed during the fall. The Wyoming avenue bridge will cost $50,000. It will be a viaduct supported on steel columns and masonry piers. It will be 770 feet long, with a roadway of 36 ft. width and two sidewalks, each eight feet wide. The Torresdale avenue bridge will cost $60,000. It will be a plate girder steel structure on masonry piers and abutments. It will be 157 ft. 6 in. long. The roadway will be 38 ft. wide, with 10 ft. sidewalks on each side.

Toronto, Ont.—Tenders are being called by James McDougall, Engineer for County of York Court House, Toronto, for the construction of a steel bridge over Highland creek in the Kingston road.

West Chester, Pa.—Bids were opened last week by the County Commissioners for the erection of bridges over Chester creek in East Goshen; over White Clay creek in New Goshen and over Beaver creek in East Brandywine. They will be 3 ft. 6 ft. and 45 ft. long respectively. Mr. T. E. Farrell secured the contract for the East Goshen bridge at his bid of $975. There were four other bids ranging from $1,079.70 to $2,882. Oliver Russell will construct the masonry of the New Gordon bridge, his bid being $560. The contracts for iron work were not let. Bids were submitted by the Vulcan Road Co., Nelson & Buchanan, F. C. Austin, Horsehead's Bridge Co., Wrought Iron Bridge Co., Denithorne & Son, Toledo Bridge Co., Berlin Co., Edge Moor Co., Masillon Co.

Westfield, N. Y.—The question of building a new iron bridge at Main street in this town is again to be submitted to a vote at a special town election. The estimated cost of the proposed bridge is $15,000 and the proposition to build it has been once defeated at a town election. It was supposed that the present bridge could be repaired at a comparatively small cost, but the engineers report that it will cost $6,000 to repair the bridge, and it has been decided to again submit the question of building a new structure to a vote at a special election.

Yarmouth, Ont.—James A. Bell, C. E., of St. Thomas, Ont., is preparing plans for the township of Yarmouth for a new iron bridge to replace the Tiger bridge across Catfish creek.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware, semi-annual, 3 per cent.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Marquette, Houghton & Ontonagon, annual, Marquette, Mich., July 19.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Freight Claim Association will hold its semi-annual meeting in Buffalo, N. Y., on August 8. The headquarters will be at the Hotel Iroquois.

The Society for the Promotion of Engineering Education will hold its first annual meeting in Brooklyn, N. Y., from August 20 to 23.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York city, on the third Thursday in each month, at 8 p m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

Civil Engineers' Club of Cleveland.

A regular meeting was held June 12; thirty-seven members and visitors present. Prof. C. H. Benjamin read a report from the Board of Managers of the Association of Engineering Societies in regard to the change in postal laws affecting the *Journal of the Association*.

Mr. H. C. Thompson moved that a committee be appointed to make necessary arrangements for a picnic to be held some time during July. The location date and other arrangements to be left entirely with the committee, and said picnic to take the place of the regular July meeting. The motion was carried.

The tellers announced the election to active Membership of Messrs. N. S. Crouch and W. S. Thompson. Prof. C. F. Mabery then presented a paper entitled "The Composition of Ohio and Canada Petroleum." The paper was followed by a discussion by Prof. J. W. Langley, Prof. E. M. Morley and Messrs. Swasey, A. E. Brown, N. B. Wood, M. E. Rawson and C. M. Barber.

PERSONAL.

—Mr. T. H. Aldrich, General Manager of the Tennessee Coal, Iron & Railroad Co., has tendered his resignation as general manager of that company. He will open an office at Cincinnati.

—Mr. C. W. Chears, General Freight and Passenger Agent of the Savannah Americus & Montgomery Road, has been appointed General Manager of the Georgia Midland & Gulf Road, of which he was formerly General Freight and Passenger Agent

—Mr. Robert Neilson, and Miss Margaret M. Patton, of St. Mary's, Pa., were married on July 9, and have sailed from New York, for a trip through Europe. Mr. Neilson is General Superintendent of the Philadelphia & Erie and Northern Central roads.

—Mr. William T. Small, Superintendent of Motive Power of the Buffalo, Rochester & Pittsburgh railroad, died suddenly in Rochester, N. Y., July 6. Mr. Small was one of the best known railroad men in the country. He went to Rochester in 1893. He was for some years previous to 1891, Superintendent of Motive Power of the Northern Pacific road.

—Mr. W. H. Kennedy, of Portland, Or., has been appointed Chief Engineer of the Oregon Railway & Navigation Company's lines which are now being operated independent of the Union Pacific by Edward McNeill as

Receiver. Mr. Kennedy was formerly chief engineer of this railroad line, but resigned in 1893, and has since been engaged as consulting engineer at Portland.

—Mr. William G. Green, who died at Tallula, Ill., on June 30 was the first President of what is known as the Jacksonvillle Southeastern Railroad. He was one of the organizers of what is now the Jacksonville Branch of the Chicago & Alton and was for a time President. He also helped to organize the Springfield & Northwestern now known as the Jacksonville Southeastern, and became President of that company also. He was a member of a private banking firm at Petersburgh, Ill., in early life, and at the time of his death was one of the owners of a bank at Tallula.

—Mr. Joseph Tomlinson, late president of the Institute of Mechanical Engineers, London, and one of the directors of the Taff Vale Railway Company, died last month. He was 72 years of age, and one of the oldest locomotive superintendents in the kingdom. He began his career on the Scottish Central Railway in the locomotive department, was for some years on the Southwestern Railway, and later on the London & Northwestern. Subsequently he entered the service of the Midland Company as chief assistant engineer, and later became the locomotive superintendent of the Taff Vale Company. Later he took charge of the engineering, locomotive, and carriage departments of the Metropolitan Railway. He held this position until after the opening of the Inner Circle line, and then he left the Metropolitan Company and set up in London as a consulting engineer.

—Mr. V. E. McBee, General Superintendent of the South Carolina Lines of the Richmond & Danville, who has been so long identified with the Richmond & Danville in responsible positions, is to retire from the service of the railroad, having decided not to continue with the successor company, the Southern Railway Company, which now operates the Richmond & Danville property. Mr. McBee's connection with the Richmond & Danville goes back to 1869, and he has been continuously in its service since that time, rising from humble positions through all the grades in the operating department to General Superintendent of its most important division and to be President of several of its subsidiary railroads. After serving as brakeman, conductor and station agent, Mr. McBee became in 1881 Superintendent of the Western North Carolina Division and later President of the Charlotte, Columbia & Augusta and Columbia & Greenville Railroads. In 1889 when the Richmond & Danville began operating the Central of Georgia Railroad he was appointed General Superintendent of those lines, but resigned in 1892 after a receiver was appointed for the company, returning to the Richmond & Danville, Southern lines as General Superintendent of the South Carolina, Columbia & Greenville and Western North Carolina Divisions.

ELECTIONS AND APPOINTMENTS.

Beech Creek.—The office of the passenger department has been transferred from Pittsburg, Pa., to Reading Terminal Station, Philadelphia.

Butte, Anaconda & Pacific.—The officers of this company are: Marcus Daly, President; M. Donahue, Vice-President; A. H. Melin, Auditor and Treasurer, and C. A. Swineford, Superintendent, all with headquarters at Anaconda, Mont.

Canadian Pacific.—George Preston, formerly Master Mechanic at Toronto has been transferred to the Eastern division, and George McKinnon, Master Mechanic at Farnham, Que., succeeds Mr. Preston at Torono.

Central Vermont.—L. A. Emerson, Freight Traffic Manager, having resigned that position to become Traffic Manager of the South Carolina & Georgia, General Freight Agent, Edward A. Crittenden, in addition to his other duties, will assume charge of through and joint all rail traffic. Frank Owen, in addition to his duties as Superintendent of the Ogdensburg & Lake Champlain division, will have charge of all traffic of the Ogdensburg Transit Co., and traffic received from and delivered to the Duluth Transportation Line, and will also act as Division Freight Agent, with headquarters at Ogdensburg, N. Y.

Delaware & Hudson.—The office of Superintendent C. R. Manville, of the Pennslyvania division will be moved from Carbondale to the new station in Scranton, Pa.

Elkton & Middletown.—The annual meeting was held in Elkton, Md., on July 3 and the following directors were elected: Jacob Tome, Samuel Rea, of Philadelphia, Henry D. Welsh, George S. Woolley, Samuel C. Rowland, John H. Jamar and Henry H.. Brady.

Fitchburg.—J. W. Richardson for some years Auditor of Freight Accounts, has had transferred to him the passenger accounts also, making him auditor of traffic acconuts. His headquarters are at Boston, Mass.

Forest City & Sioux City.—The present officers of this company in South Dakota are: William H. Bulkely, President and Treasurer, Hartford, Conn.; C. H. Webb, Vice-President, and W. F. Smith, Secretary and General Manager. The general offices are at Forest City, S. D.

Galveston, Harrisburg & San Antonio.—The annual meeting was held in Houston, Tex., on July 3. C. P. Huntington was elected President; J. Kruttschnitt, Vice-President; Paul Fiato., Treasurer, and Charles B. Seger, Secretary. The directors elected were: C. P. Huntington, J. Kruttschnitt, E. P. Hill, W. G. Van Vleck, I. E. Gates, W. B. Umlvey, Charles Babbidge, Charles B. Seger and Paul Flato.

Glendon & Gulf.—A circular has been issued announcing that Frank D. Jones, Chief Engineer, has been appointed Superintendent in charge of the operating and traffic departments, the appointment taking effect July 1. The office of Chief Engineer has been abolished, and the duties of that office will be attended to by the Superintendent.

Lake Street Elevated.—At an election of directors at Chicago on July 5, the following were elected: William Bingden, Clarence A. Knight, John A. Roche, John H. Witback, B. E. Sunny, A. S. Littlefield, Solomon Sturgis, Jr., A. P. Richardson and D. H. Louderback. The retiring Directors are: G. B. Shaw, H. P. Thompson, H. Deere, D. W. Campbell and William Baker.

Louisville & Nashville.—Benjamin Hopkins has been appointed Florida Passenger Agent with headuarters at Jacksonville, Fla., to suceed J. A. Steltenkamp, transferred.

Louisville, New Albany & Chicago.—George Brecount has been appointed Superintendent of Transportation of the Road, with headquarters at Indianapolis, Ind.

Louisville, St. Louis & Texas.—General Manager J. K. McCracken has resigned and the Receiver has abolished the office. A. M. McCracken has been promoted from Superintendent to be General Superintendent, and Ridgely Cayce from Car Acountant to Assistant to the Receiver.

Mexico, Cuernavaca & Pacific.—W. W. Mayberry having resigned, W. T. Sprague has been appointed Superintendent with headquarters at the City of Mexico.

Minneapolis & St. Louis.—Joseph L. Blake has been appointed commercial agent at Minneapolis, vice J. S. Whitcomb, resigned; E. F. Farmer has been appointed traveling freight agent, with headquarters at Minneapolis, vice J. L. Blake promoted.

National City & Otay.—B. Cheney, Jr., has been elected President of this company and C. D. Lanning, Treasurer, both with headquarters at Boston, Mass.

Northern Adirondack.—J. G. Church has resigned as Traveling Freight Agent of the Central Vermont, to accept the position of General Freight and Passenger Agent of the Northern Adirondack road, N. Y.

Ohio River.—W. P. Thompson has been elected Chairman of the Executive Committee, with office at No. 1 Broadway, New York City.

Ohio River & Charleston.—The following have been elected directors of this road, under which name the Charleston, Cincinnati & Chicago has been reorganized; John Goldthwait, Boston; Samuel Hunt, Cincinnati; R. M. Morse and C. E. Hellier, Boston, and J. J. Collier of Philadelphia.

Pittsburg & Western.—R. Finney, Jr., has been appointed General Agent and Purchasing Agent, with headquarters at Allegheny, Pa., vice J. J. Saint.

Santa Fe, Prescott & Phoenix.—H. J. Austin, formerly Chief Clerk in the city office of the Wabash, at Detroit, Mich., has been appointed Assistant to General Manager Vaughn, of this company. His headquarters will be at Prescott, Ariz.

South Carolina & Georgia.—C. M. Ward having resigned as General Manager, Mr. L. A. Emerson has been appointed Acting General Manager, with office at Charleston, S. C.

Southern Railway Co.—General Manager Green has issued a circular announcing that V. E. McBee having declined to accept service with this company, the following changes have been made: The jurisdiction of J. A. Dodson, Superintendent Atlanta & Charlotte Division, is temporarily extended over the Asheville & Spartanburg, Spartanburg, Union & Columbia, Atlantic, Tennessee & Ohio, and Statesville & Western Railroads. The jurisdiction of E. Berkeley, Superintendent North Carolina Division, is temporarily extended over the Western North Carolina Division.

Wisconsin Central.—C. B. Rinnan has been appointed general agent with headquarters in New York city.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Atlantic Coast Line.—The branch road being built by the Manchester & Augusta Railroad to connect with the South Bound Railroad, has been completed, the last rail having been laid near Denmark, S. C., on July 3. The line just completed is 44 miles long, beginning at Rimini, south of Sumter, S. C., and extending southwest to Denmark, where it connects with the South Bound Railroad. By this connection with the South Bound Railroad the Atlantic Coast Line secures a shorter route to Augusta, Ga., Charleston, S. C., and other southern points. The work was begun last October. The road has been substantially built and is laid with 70 lb. rails. The maximum grade is reported as being 33 ft. to the mile and the curves as two degrees.

Atlantic & Superior.—The projectors are now attempting to secure from the Dominion Parliament the necessary legislation concerning the recent agreements for the purchase of the Bay de Chaleurs Railroad, the Great Eastern, the Ottawa Valley and the projected Montreal Bridge. Some of these roads are now being built and operated by C. N. Armstrong of Montreal, and with other projected connections they are to form a road proposed by him to reach to Sault Ste. Marie. The bill as at present framed has met with influential opposition, chiefly on behalf of the creditors of the railroads now built, and the ultimate success of the present bill seems doubtful.

Bangor & Aroostook.—The grading on the extension north of Houlton, Me., is now well under way on the entire line. The contract is held by C. P. Treat of Chicago, who built the road to Houlton last year. All the sub-contracts have been given out also. The route is from Houlton to Caribou Me., through Littleton, Monticello, Bridgewater, Blaine, Mars-hill, Westfield and Presque Isle and the Fort Fairfield Branch via Sprague's Mills and Easton to Fairfield. The bridge work on this extension includes a 400 ft. steel truss in three spans of 100 ft. each and two of 150 ft. each over the Meduxnakeag river at Houlton with 250 ft. wooden temporary trestle approach at each end; a 410 ft. steel viaduct over Meduxnakeag river in Monticello; a 450 ft. steel truss in three spans with 150 ft. steel viaduct at the south end and a 180 ft. steel viaduct at the north end over the Aroostook river in Presque Isle; and 50 ft. plate girders at Johnson brook, Whitney brook and "Three brooks" and Clark brook, and a 40 foot plate girder at Young's brook. Moses Burpee, of Houlton, is in charge of the work as Chief Engineer.

Charleston, Clendennin & Sutton.—The preliminary surveys for the northern extension of this railroad are now being made both from the lower end of the line and also from Sutton, W. Va., the proposed terminus. The railroad is now controlled by the Pittsburgh and Philadelphia interests who intend to complete the line through to Sutton. It is now in operation from Charleston to Clendenin in Kanawha county and the distance from the latter town to Sutton in Braxton county is about 75 miles. C. C. Lewis, of Charleston, is the present President of the company and W. S. Drake, of 1,326 Chestnut street, Philadelphia, is Secretary and Treasurer.

Columbus, Hocking Valley & Athens.—This company, which was organized to build a road from Columbus, O., down the Hocking canal bank to Athens, a distance of about seventy-five miles, has paid $50,000 into the State Treasury as the first installment of lease money for the use of the canal bank. This looks as though the projectors were in earnest, as the money will be forfeited to the State if the line is not constructed.

Denver, Sioux City, Lake Superior & Chicago.—The project of Ex.-Gov. Evans of Colorado for a new railroad from Denver has been organized under the above name, with the following officers: President, John Evans; W. A. H. Loveland, Vice-President; R. W. Woodbury, Treasurer, and W. G. Evans, Secretary.

Dry Fork.—This railroad, which is building from Hendricks on the West Virginia Central & Pittsburg Railroad, down the Cheat river, to the junction with Dry Fork river, and thence up that stream, was completed as far as Harmon, Randolph county, W. Va., last Saturday, a distance of about 20 miles from the starting point. The work down Dry Fork is going on, and the grading forces are at work ten miles further. The road is to open coal and timber lands, and the development along the part of the road which is completed, is well under way. Already considerable quantities of coal and timber have been shipped from points near the junction with the West Virginian Central & Pittsburg. The owners of the property are eastern people. The company's office is at Philadelphia, R. F. Whitmer, being President.

Florence & Cripple Creek.—Trains are now running regularly over this railroad into the town of Cripple Creek, Col. Through trains are run from Denver over the Denver & Rio Grande Railroad to Florence, where the new railroad begins and thence to Cripple Creek. The last rail of the new road was laid in the Cripple Creek District on June 30. The new line is 40 miles long, beginning at Florence and extending north to the Cripple Creek mines. The line is located through a cañon and most of the construction work has been very heavy. The route was described pretty fully in an article on the Cripple Creek District in the *Railroad Gazette* of December 22, 1893.

Intercolonial.—The survey for the Dartmouth branch is now being made by Engineers Archibald and McKenzie. The branch will be about ten miles long and will leave the main line to Halifax at Windsor Junction, rejoining it near Dartmouth, N. S., which is opposite Halifax.

Kingfield & Dead River.—The construction work on the railroad is fast nearing completion. The rails have been laid and the ballasting is nearly finished. The road is already doing some freight and passenger business. It extends from Kingfield north to Jerusalem, Me., about eight miles.

Lehigh Valley.—McDonald & Sayre, of Wilkes Barre, Pa., have the contract to build the second track on the line known as the Mountain Cut-Off near Wilkes Barre, Pa. The line is 20 miles long from Fairview, Pa., the next station to Glen Summit, and extending to L. & B. Junction, above Pittston. About five miles of the second track has been built and it is expected to complete the entire work this season.

New Roads.—O'Brien J. Atkinson, John G. O'Neill, John W. Porter, John M. Hoffman and Marcus Young have been appointed a commitee at Port Huron, Mich., on the proposed railroad from that town north along the shore to Lexington, about 25 miles. Lexington is reported to have raised $30,000 as a subscription for the road, and the right of way can be easily acquired.

The county of Transylvania, North Carolina, has voted $60,000 of bonds to help build a railroad from the Henderson (N. C.) county line to the town of Brevard, N. C., which is the county seat of Transylvania.

Capt. De Lamar, a large mine owner in the Ferguson district near Pioche, Nevada, is organizing a company, with other mine owners, to build a railroad from Milford, Utah, to Pioche, so that the ore from that district may be shipped to the Salt Lake valley for treatment. The Union Pacific had nearly 100 miles of grading done to the southwest during the last year of President Adams' administration and it is supposed that the pojectors of the proposed line will take advantage of the work already done.

Oklahoma Central.—This company was granted a charter at Guthrie, Ok., last week, to build a railroad from Arkansas City, Kan., to Eagle Pass, Tex., with a branch from Hunnewell to Parker, Ok.

Philadelphia & Delaware County.—General Manager Prevost announces that this branch road, opened for traffic on July 3, will be operated by the Philadelphia, Wilmington & Baltimore Railroad Company, and will form a part of the Central division. The new line starts at Fernwood, on the Central Division, 5.5 miles from Broad street station, and extends to Newtown Square, 15.4 miles from Broad street. Stations have been established at Pembroke, 6.1 miles from Broad street; Wycombe, 6.8; Garrett Road, 7.3; West Chester pike, 8.9; Grassland, 10.3; Coopertown Road, 11.8; Foxcroft, 12.7; The Hunt, 13.4 and Newtown Square.

Robeline & Sabine Parish.—This railroad is being built chiefly as a lumber line by the Caddo Mills Lumber Company, of Shreveport, La. The railroad, when completed, will be about 25 miles long from Victoria in Natchitoches County, where the mills of the company are located, and where it connects with the Texas & Pacific Railroad to Many in Sabine Parish. The railroad is being built directly by the lumber company of which John R. Jones, of Shreveport, is President. At the present time over 10 miles of line have been built and the work is now proceeding on the next 10 miles. The chief bridge work is a trestle 550 ft. long and 40 ft. high.

State (Texas).—The railroad being built out of Rusk, Tex., under the management of the officers of the Texas State Penitentiary, has been graded for eight miles and about that amount of track has been laid. About 300 convicts of the penitentiary at Rusk, Tex., have been employed on the road for some months. It is intended to connect the line with a standard gage railroad and it will be about 30 miles long, probably joining the International & Great Northern road. L. W. Wells, of Tyler, Tex., is in charge of the work as Chief Engineer.

Tavares, Atlantic & Tampa Bay.—Some surveying is now being done on this road near Yallala, Fla. This is a small town in Lake county east of Tavares, beyond which several miles of road was graded in 1892, St. Clair Abrams being then the President of the company. The contract for grading part of the line is now held by W. E. Simmons.

Washington & Chesapeake Beach.—A new start has been made in the construction work of this railroad building from near the city of Washington to Chesapeake Beach, Md., 30 miles. At present the force at work is not very large but the officers still promise that the work will be completed during the Fall. The work now going on is under the direction of the company's officers. Coffin, Sullivan & Co., of New York, who had the contract to build the railroad, have surrendered the contract.

Wheeling, Cadiz & Northern.—The organization of this company has been recently reported in Ohio. The projected road is to have its southern terminus at Wheeling, West Va., with Sandusky City on Lake Erie as the northern end of the road. The purpose of the road is to provide an outlet for the product of several thousand acres of West Virginia and Ohio coal lands owned by the projectors. These coal lands lie between Wheeling and Hopedale, Harrison county, O., and the line proposed is from Wheeling to Hopedale via Mt. Pleasant, thence to Cadiz, Little Stillwater, Laceyville and Tappan to New Philadelphia, and thence by way of Wooster to Sandusky City.

Wichita Falls.—This company has filed a charter a Austin, Tex., with a capital stock of $100,000. J. A. Kemp, A. Newly, R. E. Huff, O. T. Bacon, A. D. Anderson, R. M. Moore and others are the incorporators. This road is to extend from the city of Wichita Falls to Henrietta, Texas, running through portions of Clay and Wichita counties. The distance of the road is 19 miles, the principal office being at Wichita Falls. This road is to be operated by the Missouri, Kansas & Texas when built. Henrietta is the terminus of a branch of that company and the extension of it to Wichita Falls will parallel the road of the Fort Worth & Denver City.

Wyoming & Dakota.—The railroad to the Hay Creek coal fields in Wyoming, heretofore referred to as the Wyoming & Pierre railroad, is being built under this title. It will connect with the Fremont, Elkhorn & Missouri Valley Railroad near Minnesela, S. D., and extend fourteen miles in South Dakota and about six miles in Wyoming to the Hay Creek coal fields of Wyoming. The road will be owned and operated by the Wyoming Coal & Coke Company of Barrett, Wyoming, as an independent line. The Chief Engineer is H. T. Vincent. The surveys are all completed and contracts for the entire work were let June 14, to the Crouch Construction Co. of Rapid City, S. D. The work will be finished September 15. The material consists largely of earth, with some loose and solid rock. The maximum grades are about one half of one per cent. and the maximum curves four degrees. The money for the construction has been provided by the Wyoming Coal & Coke Company of which George M. Nix, of Dubuque, Iowa, is the General Manager.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—Certain of the stockholders who are opposed to the assessment on the stock proposed under the recently issued reorganiaztion plan have formed a committee to represent their interests. It is composed of Theodore W. Myers, Benjamin F. Tracy, J. H. Neale, Henry Clews and R. N. Tailer, of New York, and M. V. B. Edgerly, of Springfield, Mass.

A syndicate is being formed to advance the money necessary to pay the coupon due Jan. 1 last on the general mortgage bonds of the Company. It must be paid before July 20 or the holders will be entitled to institute foreclosure proceedings.

Cape Fear & Yadkin Valley.—The receivership case which was to have been heard before United States Judge Dick at Greensboro, N. C., July 3, has again been postponed, at the request of Receiver Gill. No date has yet been set for the adjourned hearing.

Central of Georgia.—Receiver Comer has been in New York some three weeks, in conference with the reorganization committees. The plan now agreed upon provides for the issue of $7,000,000 first mortgage five per cent bonds, $13,000,000 consolidated five per cent. bonds and $10,000,000 of guaranteed bonds, to bear interest at 2½ per cent. for two years and increasing at the rate of ½ per cent. yearly, until they shall bear five per cent. The fixed charges on the property for the first two years, under the plan will be $1,900,000. They will then increase $50,000 per annum until 1901, when they will remain at $2,150,000 a year. There will also be an issue of $8,000,000 five per cent income bonds, class "A," non-cumulative, to be used for taking up the debentures and certain guaranteed bonds, dollar for dollar. Income bonds, class "B" at five per cent., will be issued to the extent of $4,000,000. The total charges ahead of the stock after 1901 will thus be $2,750,000. The reorganization covers the entire system as now constituted. New stock will be issued for the present outstanding stock of $7,500,000. The Southwestern of Georiga and Augusta & Savannah roads will receive five per cent. on their stocks, the new system assuming the $2,000,000 judgment against the Southwestern under the tripartite mortgage. It is expected the reorganization will be completed by October 1. The Southern Railway Company, will control the new system, but it will be operated independently.

Chesapeake, Ohio & Southwestern.—An important order was issued by Chancellor Edwards last week in the suit of the Louisville & Nashville to secure control of this property. The temporary injunction secured by the state of Kentucky to prevent the Louisville Nashville assuming control of the property on the ground that the lines were competing and the arrangement which it was attempted to carry out was illegal, was made permanent. The injunction was issued under a clause of the recent state constitution forbidding the purchase or lease of competing railroads. Chancellor Edwards holds that the charter for the Chesapeake, Ohio & Southwestern forbids its sale to a competing line and also that the contemplated purchase is contrary to the State constitution, the lines being competitors. The officers of the Louisville & Nashville argued that the charter of that company allowed a purchase and that the only competition was between Louisville and Memphis, which being interstate could not be proceeded against under the Kentucky laws.

East Tennessee, Virginia & Georgia.—Samuel Spencer, President of the Southern Railway Co., purchased the property of this railroad at the foreclosure sale at Knoxville, Tenn., on July 7. The property was bid in for $1,505,000 and it is expected that the sale will be confirmed next Saturday so that the transfer to the new owners will be made by Aug. 1, after which the road will be operated by the Southern Railway Co.

Louisville Terminal.—The foreclosure sale of this property has recently been ordered by the United States Court. The company has valuable franchises for belt railroads in Louisville and suburban towns but operates only three miles of railroad near South Louisville built in 1892. About six miles of additional road has been graded but the track has never been laid.

Northern Pacific.—The receivers report gross earnings for April of $974,285, and net earnings from operating of $261,623. Income from other sources was $1,294, making the total income $262,917. The accrued charges for the month, that is, rentals, taxes, interest uopn receivers' certificates, first mortgage bonds, and collateral trust notes, amount to 457,428, leaving a deficit of $194,511. Unpaid charges, that is, interest upon all obligations after the first mortgage, amount to $473,864, making the total deficit for the month $668,375. The gross earnings from Aug. 16, 1893, when the receivers were appointed, to April 30 last, were $10,911,125, the net earnings $4,128,817, and miscellaneous income $389,925, making the total receipts $4,518,742. The accrued charges, as defined above, were $4,009,711, leaving a balance of $509,030. The unpaid charges, that is, interest upon the a second, third, and consolidated mortgages, were $4,080,013, making a total deficit of $3,576,983. The figures given do not include the operation of branch lines now in the hands of separate receivers.

The are two reorganization committees no seeking to secure the support of the bondholders for the reconstruction of the property. The committee of which E. D. Adams is chairman and which was formed last November, as a consolidated mortgage bondholders' committee now appeals to the holders of the second and third mortgage bond also to deposit their bonds under the agreement of Feb. 19. The committee will henceforth act as a general reorganization committee. The committee in making this change in its plans points out that when the committee was formed it seemed as if the reorganzation could be undertaken without disturbing the second and third mortgage bonds, but on account of the great falling off in net earnings the interest has not even been earned on the second mortgage bonds and the original plan became impracticable. Johnstone Livingston is head of the opposition committee, the protective committee of second and third mortgage bondholders, and asks for the the continued reports of such bondholders.

Pennsylvania.—The statement of the earnings of all lines east of Pittsburg and Erie for May, 1894, as compared with the same month in 1893, shows a decrease in gross earnings of $1,813,919; a decrease in expenses of $864,313; a decrease in net earnings of $949,605. The five months of 1894 as compared with the same period of 1893, show a decrease in gross earnings of $6,017,059; a decrease in expenses of $4,657,384; a decrease in net earnings of $1,359,674; all lines west of Pittsburgh and Erie for May, 1894, as compared with the same month in 1893, show a decrease in gross earnings of $1,090,268; a decrease in expenses of $354,280; a decrease in net earnings of $735,988; the five months of 1894, as compared with the same period of 1893, show a decrease in gross earnings of $3,457,812; a decrease in expenses of $2,377,283; a decrease in net earnings of $1,080,528.

Southern Railway Co.—The first meeting of the company was held in Richmond, Va., on July 5. No changes were made in the Board of Directors. Samuel Spencer, the president, and C. H. Coster, of the Richmond Terminal Reorganization Committee, with other officials, attended the sale at Knoxville on July 7, of the East Tennessee, Virginia & Georgia, and on July 10, at Columbia, the sale of the Columbia & Greenville and Charlotte, Columbia & Augusta Railroads. The Louisville Southern will be sold on August 16; the Georgia Pacific on August 18; the Western North Carolina and Northwestern North Carolina on August 21, and the Oxford & Clarkesville and Clarkesville & North Carolina on August 22, completing the list of foreclosures.

The East Tennessee, Virginia & Georgia was purchased by President Samuel Spencer at the foreclosure sale, and that property will come into the company's possession on Aug. 1. President Spencer, answering a question as to the organization of the new company, replied that there would be no essential change from the previous organization. "It is fully recognized that the properties in question are located in two distinct territorial sections, which can best be served by two local operating organizations, which, while united and co-operative as to general policy, must be distinct as regards each other. It is proposed to have a general manager for the eastern system, located for the present at Washington, and a general manager for the western system, located in Knoxville, a traffic office at Knoxville, immediately in charge of the traffic for the western system, with a similar one at Richmond for the eastern system; an auditing officer at Knoxville, in charge of the accounts of the western system, reporting results to the general office, as results have heretofore been reported to a general office in New York. The western system will likey embrace all lines west of Bristol and Atlanta."

Tonawanda Valley & Cuba.—S. S. Bullis of Olean, N. Y., has offered to purchase this road and change it to standard gauge if the residents along the line will contribute $8,000 toward the price, $30,000, at which the Continental Trust Company holds the property.

Western New York & Pennsylvania.—The reorganzation committee of the railroad has been advised that the Holland stockholders, representing 90,000 shares out of a total of 117,000 shares, have assented to the plan of reorganization, and paid their assessments. The committee has declared the plan for the reorganization of the company, operative. The committee has deposits of over 90 per cent. of the second mortgage bonds.

TRAFFIC.

Traffic Notes.

The Railroad Commissioners of Texas have issued a circular reminding the railroads that according to the law freight rates must not be changed except on ten days' notice and after the approval of the Commission.

Louisville eastbound lines have made an agreement for the distribution of eastbound freight business similar to the Chicago agreement, to be operative for ten months from July 1, the percentages to govern to be determined by arbitration.

The railroads of the Southern Passenger Association have discontinued through ticketing and freight billing over the Atlanta & Florida and the Georgia, Midland & Gulf roads, those roads having disregarded the rates and rules of the association.

The freight movement through the yards of the Pennsylvania Railroad at Columbia, for June, was as follows: Trains east, 1,205; loaded cars. 38,032; empty cars, 1,289; total, 39,321. Trains west, 567; loaded cars, 10,152; empty cars, 27,597; total, 37,749. Grand total, 70,070. This is an increase of 5,260 cars over May, and a decrease of 38,414 cars as compared with June, 1893.

The recent meeting between the officials of the Atchison and Southern Pacific resulted in the establishment of a much better feeling all around, and the settlement of the entire California passenger differences is now in the hands of the presidents of the two companies, with a strong probability that an amicable adjustment will be reached at the next conference, which will take place soon.

The severe retrenchment which some of the roads west of Chicago have found it necessary to practice on account of the loss of business due to the strike has affected the Eastern agencies. It is reported that several freight offices in Detroit have been closed, including those of the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific and the Northern Pacific. Several agents in Buffalo have been suspended, and offices in New York and Boston have been closed.

In the case of the Cincinnati Freight Bureau and the Chicago Freight Bureau against the Baltimore & Ohio and other eastern railroads, attacking the legality of the official classification and uniform bill of lading, now pending before the Inter-State Commerce Commission, Commissioner Blanchard, of the Central Traffic Association, has made answer that during the period covered by this series of classifications, the rates of freight used in connection therewith have been materially reduced. He avers that annually, since Classification No. 1 was promulgated, lower average rates of freight have been made and used in connection therewith.

Representatives of the principal railroad lines carrying freight from New York and other eastern points to the Southern States, especially those carrying in connection with coastwise steamship lines, were called before the Interstate Commerce Commission at Washington, on July 6 to answer the charge that they were violating the long-and-short-haul section of the Interstate Commerce law. It appears that the very low freight rates recently established were made to apply only at principal towns and cities. A good deal of evidence was taken, but it will have to be carefully classified and analyzed, and compared with the existing tariffs, before any action can be taken by the Commission.

The shipments of coke from the Connellsville region are now heavy and have increased at the rate of 10,000 tons a week since June 1. The anthracite coal trade is reported stagnant with no prospect of a better demand before the middle of August. The supply of pea and buckwheat sizes is now in excess of the demand. The bituminous coal trade is gradually resuming its normal condition. The total anthracite tonnage carried over the Philadelphia & Reading in June, which reached, 1,247,297 tons was the largest ever transported by it in any month, being 77,173 tons more than the tonnage of the largest previous month, which was November, 1893. A considerable proportion of this originates on other railroads,. The anthracite tonnage originating on the Reading during the last two weeks in June, 557,290 tons, was 21.7 per cent. of the total anthracite production for the same time.

The Pennsylvania Railroad has yielded to the New York City receivers of Southern vegetables and fruits and the goods are being delivered on the east side of the North river. Last year the railroad company informed consignees that the freight by the Delaware and Marlyand train would be delivered at the foot of Henderson street, Jersey City, instead of in New York, on account of the cramped condition of its dock in New York. The merchants grumbled and threatened to have their goods shipped by other lines, but the freight was delivered in Jersey City. Early this year the railroad company informed the receivers that other vegetables and fruits coming over its lines would be delivered at the foot of Bay street, Jersey City, instead of New York, giving the same reasons that it did last year—want of sufficient room to unload at its New York dock. Receivers protested that such delivery would entail great expense to them. They had formerly sold the goods on the dock as soon as they were unloaded, and they said that their customers, who had themselves carted the goods away from the dock, would not go to Jersey City. Receivers would consequently be obliged to carry the goods to their stores at their own expense. The railroad company, however, insisted on delivering in Jersey City, whereupon several receivers, it was said, began making arrangements with steamship, and other railroad lines. Lately there was another conference between the receivers and the Pennsylvania, and the latter agreed to return to the old system of delivering in New York.

Chicago Traffic Matters.

CHICAGO, July 10, 1894.

Traffic matters are at a comparative standstill owing to the strike. Very few of the roads are moving or attempting to move any freight, and passenger traffic has greatly diminished owing to the uncertainties attending any attempt to leave or pass through the city, coupled with timidity on the part of many intending travelers. One result of the strike has been the suspension of all signs of hostility between the passenger representatives who were at the commencement of the strike busily engaged in making charges and counter charges of violations of agreements. The principal trouble being over excursion rates, the cause for friction is largely removed by the cancellation or postponement of many of the gatherings. It is claimed that some of the roads that contracted for excursion business at less than agreed rates are largely out of pocket owing to the fact that they were obliged to divert it and pay some other road its full proportion of the agreed rate.

Some further attempt has been made by the Peoria lines to arrive at percentages for eastbound freight traffic, but without result, and the whole question has now been referred back to the General Managers who will meet in a few weeks and if unable to agree, will leave the question of percentages to aribtration, as was done in the case of the Chicago agreement.

Minneapolis lines have agreed to a 20 cent rate on flour and mill stuffs from Minneapolis to Ohio river points on business destined to the Mississippi Valley south of the Ohio river, with a proportion to the Minneapolis lines of 12 cents.

Lake traffic is at a stand-still as well as rail business, owing to the shutting down of the lumber interests and the almost complete cessation of grain receipts. Less business was done at this port last week than in any week for twenty years.

As was to be expected, returns of Eastbound freight for the week ending July 7, show marked effects of the strike. The Baltimore & Ohio and Big Four suffered the most, the former moving only one two-hundredth of the total tonnage and the latter none at all. As this summary includes two days prior to the inauguration of the strike, the proportion of tonnage since the strike commenced is still smaller.

The shipments of Eastbound freight, not including live stock from Chicago, by all the roads in the week ending July 7, amount to 11,666 tons, against 42,932 tons during the preceding week a decrease of 31,316 tons and against 45,793 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to July 7.		W'k to June 30.	
	Tons.	P. c.	Tons.	P.c.
Michigan Central	1,774	15.2	3,681	8.5
Wabash	1,277	10.9	3,307	7.6
Lake Shore & Mich. South	1,665	14.3	6,437	15.0
Pitts., Ft. Wayne & Chicago	1,171	10.0	4,758	11.0
Pitts.,Cin.,Chicago & St.L.	1,190	10.2	5,902	13.7
Baltimore & Ohio	52	.5	2,391	5.6
Chicago & Grand Trunk	1,084	9.3	2,923	6.8
New York, Chic. & St. Louis	1,338	11.5	5,801	13.5
Chicago & Erie	2,115	18.1	6,577	15.3
C. C. C. & St. Louis	. .	0.0	1,205	3.0
Totals	11,666	100.0	42,982	100.0

Of the above shipments, 377 tons were flour, 3,609 tons grain and millstuff, 3,070 tons cured meats, 2,252 tons dressed beef, 662 tons butter, 285 tons hides and 866 tons lumber. The three Vanderbilt lines carried 41 per cent., the two Pennsylvania lines 20.2 per cent.